SEPTEMBER, 1940

The TOOL ENGINEER

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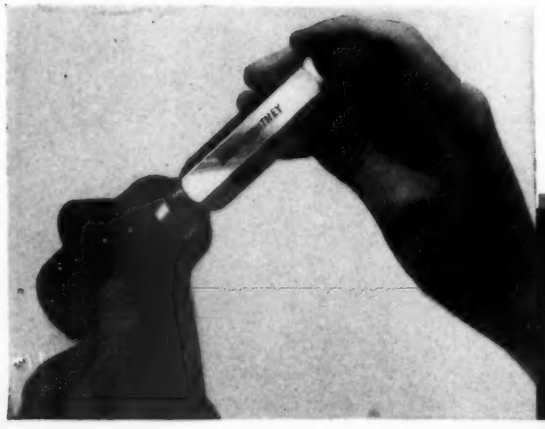

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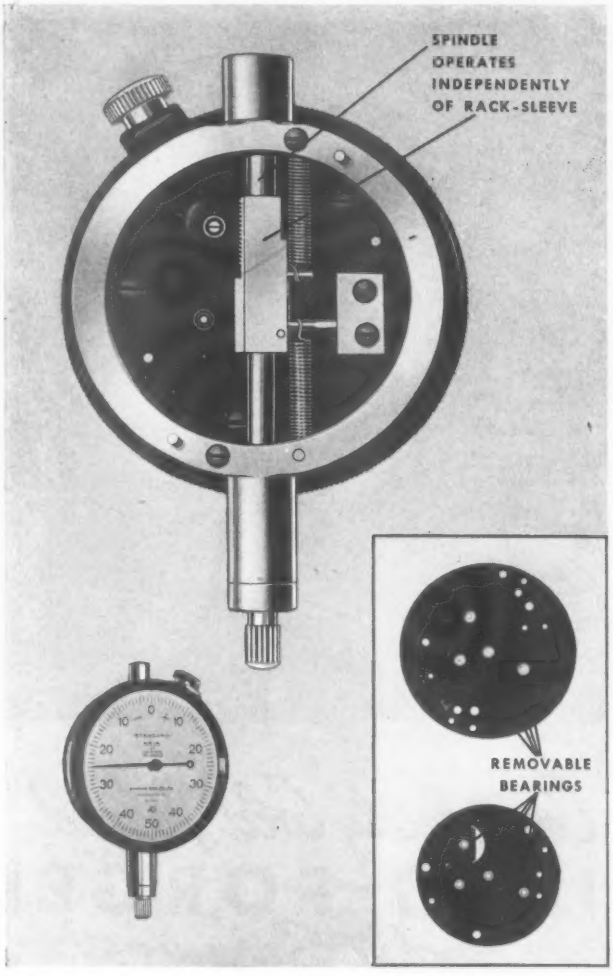

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THE TOOL ENGINEER

Official Publication of the American Society of Tool Engineers

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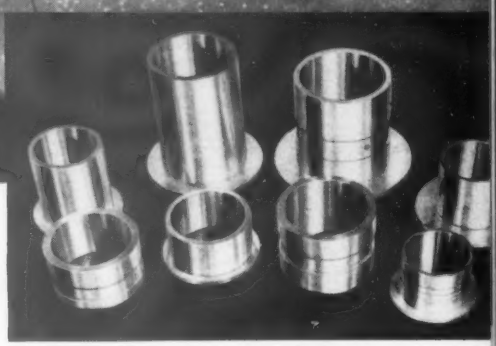

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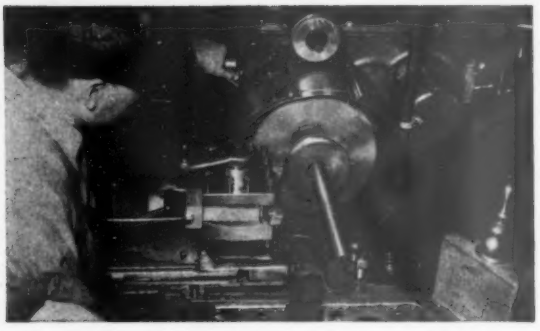

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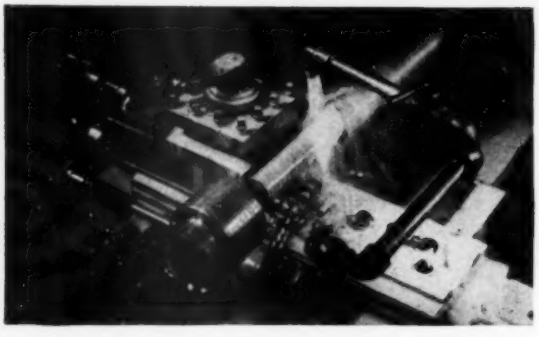

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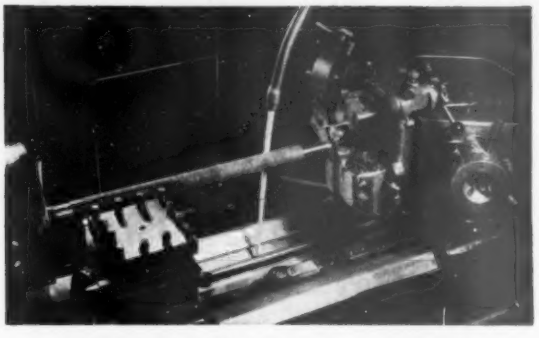

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Let's Face the Facts

An Editorial

By A. E. RYLANDER

THE press of the land, as well as the government, has suddenly become acutely conscious of the shortage of skilled craftsmen, especially in the metal trades. As this shortage becomes more apparent, we find the government in competition with private industry. "We do not want unskilled labor," says government employment agents. "We have a surplus of unskilled workers. We want trained men, expert mechanics." Indeed, and so does industry!

Editorially, and in expression of private opinion by staff writers as well as by reader contributions, THE TOOL ENGINEER has warned of this shortage for several years past. Coming events casting their shadows before them, we correctly presaged a condition which now exists, more, we showed cause why a shortage of skilled men was inevitable. That shortage is an effect of known causes, causes which have been carefully evaded by the press; now, we have a problem which can only be solved by first presenting the causes and then resolving them into a workable formula.

Basically, the causes are twofold; (1) employer indifference to apprenticeship training, and, (2) union insistence on an inadequate proportion of apprentices to journeymen mechanics. Both of these causes, the one negative, the other positive, have combined to create a state of economic and industrial chaos, have fostered unemployment and created an acute youth problem. The effect, in an approaching hour of national crisis, is that private industry has not the men needed to man the machinery of preparedness nor the government the skilled mechanics to service it. We are locking the barn door after the horse is stolen; now, we'll have to groom a new horse.

As is known to the initiated, men off the street, endowed with average mental and physical qualities, can be quickly trained to operate production machinery. From these a small proportion will stand out after initiation into the handling of tools; in any vocation, leaders will show themselves. But, with seniority rule, the leaders cannot hold their jobs on merit, and so we have a floating labor population which either goes from plant to plant or remains idle between calls. The best men have become our floaters, while the inferior workers are the ones most steadily employed.

The same holds true in the skilled crafts, where an outstanding mechanic is reluctant to change because quitting a job cancels his seniority and change of employment puts him at the tail of the list. However qualified, however skilled he may be, he is the first man laid off because he is the last man hired. That condition is comparable to peonage, a state which labor, skilled as unskilled, has accepted by subscribing to union rules of seniority. We cannot encourage the advancement of skilled craftsmen as long as the seniority rule prevails.

In the case of youth, the situation is tragic. There may be found, in our staff files, various letters from ambitious young men asking help in placement for apprenticeship training. Where these cases are referred to employers, the latter express helplessness in the face of union rules. "So many journeymen, so many apprentices; we are filled up". Youth takes up vocational training in technical schools, enrolls in evening vocational schools, intent on economic independence. Young men, possessed of this preliminary training, apply for work in tool rooms and die shops, are lucky if they find a place in the production line. "Yes, I know that my training is limited, and that it takes years to become a skilled mechanic. But I want to learn, and I am willing to sacrifice to acquire the training. Yes, I know you need skilled men, but tell me, how is one to become skilled if one can't get a job?" Vague, eh?—disconnected. But you see, the employment manager can't tell him that union rules proscribe his hiring; the truth would be prejudicial. For that matter, the employer is enjoined by law, in many cases, from telling the truth to workers actually employed. The Wagner act so enjoins him.

Well, there we have it, sketchily outlined but on the whole factual. The conditions that bar the training of men, except on a negligible scale, have been stated. What, now, are we going to do about it? Obviously, we cannot build the machinery of defense without skilled men; the bottleneck of the Preparedness Program is not the machine tool industry, as one crackpot put it, but trained men. And while the employers may be partly at fault, as previously intimated, the fact is that many of the larger concerns, and most of the older established, have been training apprentices throughout their years of existence. But these cannot fill the demand; the graduate apprentices are needed as leaders and key men. We need more skilled workers, and more skilled workers we must have even if it means the complete revocation of the Wagner Act and the complete abolition of the unfortunate seniority rule. In this age of demand, the "senior" need not fear for his job, but he can keep a better man from helping him to hold his job and he can keep a young man, anxious to learn, walking the streets and swelling the ranks of the idle. Let these causes be removed, and the effect will be an immediate spurt in training courses. The new horse stands chafing at the barrier.

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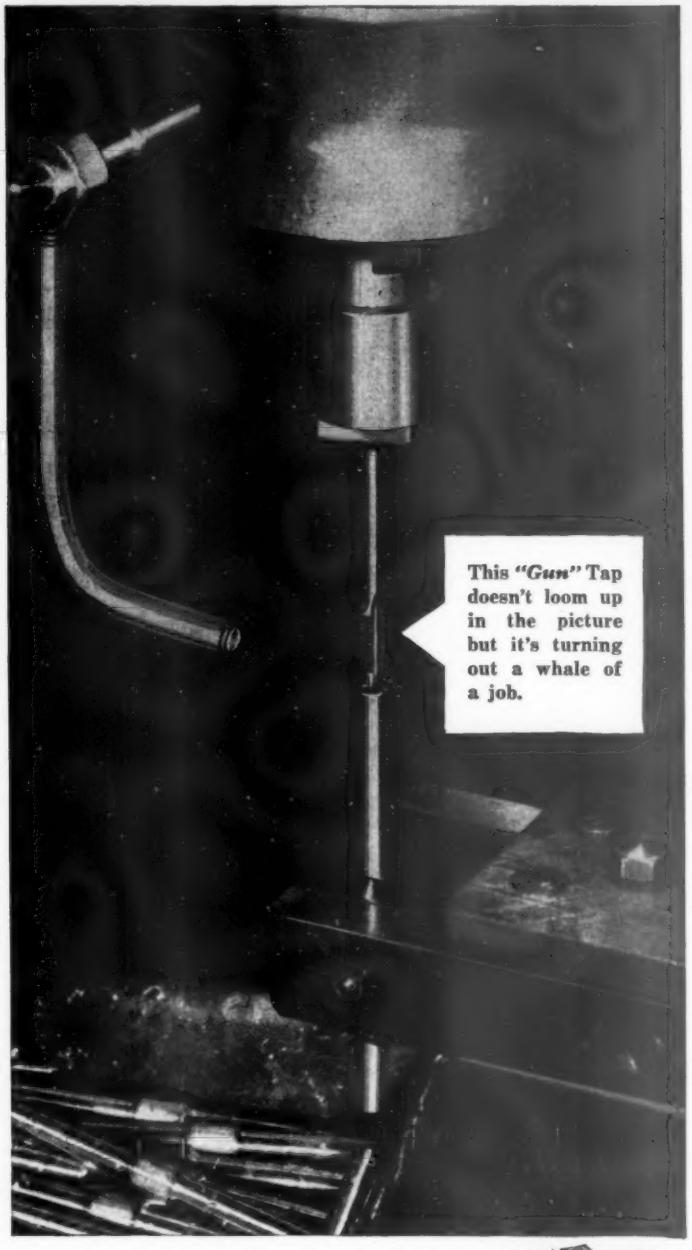

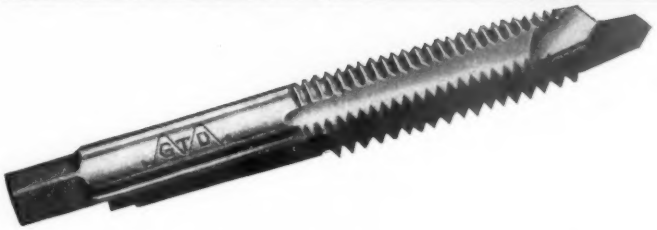

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TAPS · DIES · GAGES · TWIST DRILLS · REAMERS · SCREW PLATES · PIPE TOOLS

For nineteen months Bert Carpenter was stationed in Paris as a representative of the National Automatic Tool Company in connection with the armament programs of the allied nations. And those nineteen months were the last in the history of the French Republic.

Today safely back in America after a nerve racking flight to the south of France on the eve of the fall of Paris, the man who was the third national president of the American Society of Tool Engineers tells a vivid first hand story of the collapse of France and reports upon manufacturing conditions in Europe.

This Was France

By
T. B. CARPENTER
National Automatic Tool Company
(as told to J. A. Ashburn)

UPON this journey I was accompanied by my wife, a Detroit girl, formerly Ruth Piccard of the Tool Engineering Department of Cadillac Motors. I went to Europe alone and after a month there telephoned from Paris to Detroit. Ruth came over at once and we were married in London. We made our headquarters in Paris but business frequently took me to England and occasionally to Holland, Belgium, and Sweden.

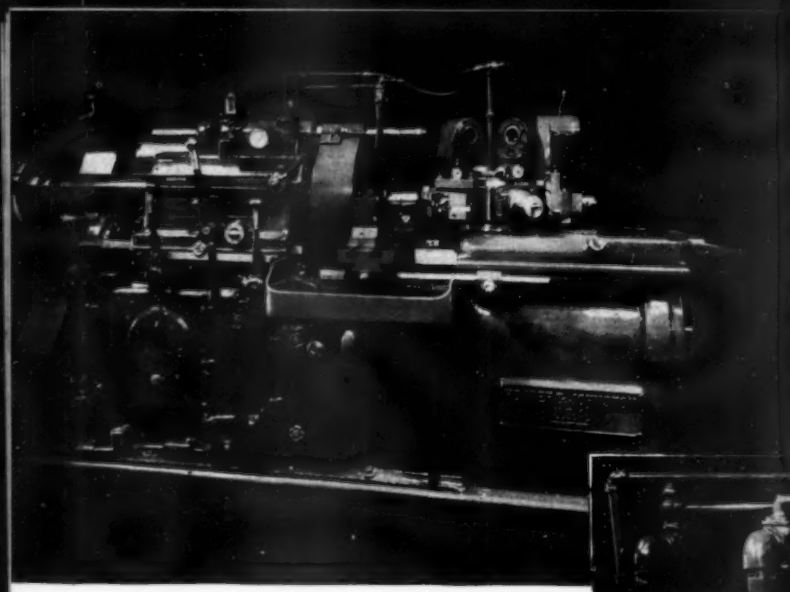
Even before the actual declaration of war, life was far from the free, easy, continental thing we had been led to expect. Yet there were many appealing aspects about it; there was good food and drink, it was possible to reach almost any sort of climate within a distance of five hundred miles, in Paris we enjoyed an even climate the year around with only rare freezes and a thermometer seldom over eighty, and perhaps most pleasant of all there were none of the flying insect pests which plague America—no flies or mosquitoes to ruin a good dinner at one of the picturesque sidewalk cafes which abounded in Paris.

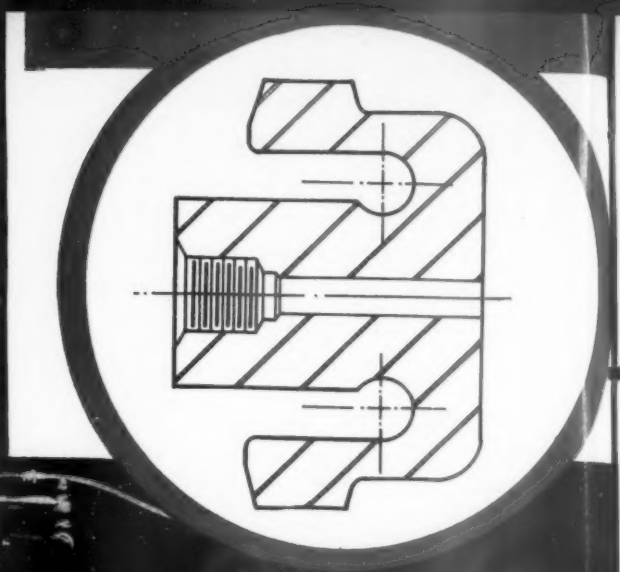
Yet against this was the continual tension, the feeling of impending disaster which was ever present. There were strong under-currents of communism, monarchism, and other isms which were officially abolished when war was declared but which nevertheless continued on in the spirit and heart of their supporters. There was a softness and definite lack of energy in both social and business life which doubtless had much to do with the final collapse.

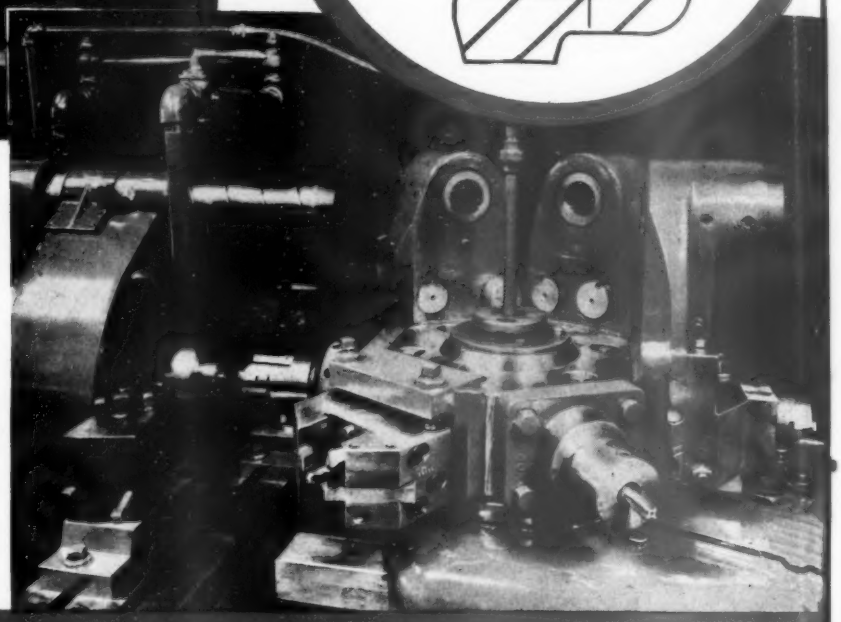
Lack of Preparedness Program

Although France to all intents and purposes began serious re-armament when the situation first became grave, they did the same thing we seem to be doing here —they appropriated large sums of money but did not use it soon enough or well enough. To make matters worse they had little knowledge of the mass production technique except as it was introduced by American Tool Engineers, and in their efforts to duplicate our methods they were hampered by their own military and political restrictions.

The skeleton organization of the Tool Engineering Departments was much the same as that we know here; they had in general the same drafting and Tool Engineering systems involving blue prints, routing sheets, operation layouts, and plant layout departments. Thus far did their methods follow ours. It was in the actual work of production that the breakdown came. We had particular difficulty in trying to increase the production of various guns, motors, and ordnance materials which had already been in production. Even though new methods were devised and new operation sheets had been prepared in order to utilize American machinery and methods, and although this information was properly disseminated to the workmen, the French shopmen with their love of individuality found it difficult to abandon the ways of their fathers and conform to the requirements of mass production. When we were given a brand new piece of equipment to tool up, the entire operation sequence and tooling was laid down from beginning to end around American machinery and methods and we were more successful than when we at-







P & J AUTOMATIC and SPECIAL TOOLING PROFITABLY PRODUCE AIRCRAFT ENGINE REDUCTION GEAR PINIONS BRINELL READING 260

Due to the comparatively recent extraordinary increase in the use of aircraft for transport as well as the offense and defense operations of the Army and Navy both in this country and abroad, many new problems have been presented to the manufacturers of engines and propellers. As shop manufacturing schedules have been stepped up, it has been found advisable to change in many cases from hand operated machines to those of the semi-automatic type. As P. & J. engineers have had a close and active part in a cooperative effort with the aircraft engineers in the development of machines and special tool equipment, which would at all times be in tune with the changing requirements, it is only natural that Potter & Johnston Automatics now predominate in the production of those engine and propeller parts offering the most serious problems to the producers.

The three operations on the Reduction Gear Pinion described are one outstanding example of achievement along the lines mentioned. The subject while small in diameter is made from a drop forging of quite high Brinell reading. There is considerable stock to remove, a deep trepanning cut is required, which is undercut at the bottom, and the final finish must be to an exceptionally high standard. For engineering recommendations covering similar production problems send your data to P. & J. Engineers. Our new bulletin will also be of interest.

POTTER & JOHNSTON MACHINE COMPANY

PAWTUCKET, R. I., U. S. A.

FACTORY REPRESENTATIVES: William L. Martin, Headquarters at Factory, New England States and Eastern New York and New Jersey; A. W. Stone, 286 Kenyon Ave., Plainfield, N. J.; Western New York and New Jersey, Eastern Pennsylvania, Maryland, and Delaware, G. Tell DuBois, 8-134 General Motors Building, Detroit, Michigan; Michigan and the City of Toledo, Ohio; Louis K. Voelk, 14014 Woodworth Road, East Cleveland, Ohio; Ohio — with the exception of Toledo; and Western Pennsylvania; Hussey & Schuster, 743 N. Fourth St., Milwaukee, Wisconsin; Illinois, Missouri, Wisconsin, Iowa and Indiana. AGENCIES: Star Machinery Company, 1741 First St., South, Seattle, Washington; Hanes Morgan Machinery Co., 2026 Santa Fe Ave., Los Angeles, Calif.; Jenison Machinery Co., 20th and Tennessee Sts., San Francisco; Wessendorff, Nelms & Co., Inc., 320 Franklin Ave., Houston, Texas; Arthur Jackson Machine Tool Co., 60 Front St., West, Toronto 2, Ontario; Arthur Jackson Machine Tool Co., 437 Grosvenor Ave., Montreal, Canada; Burton Griffiths & Co., Ltd., Birmingham, England; R. S. Stokvis en Fils, Paris, France; Koninklijke Machinefabriek Gebroeders Smits, Delft, Holland; and Bruxelles, Belgium; Maskinaktiebolaget Karlebo, Stockholm 1, Sweden; Ing. Ercole Voghi, Milano, Italy; Yamatake & Co., Ltd., Tokyo, Japan; Imperial Export Co., 44 Whitehall St., New York, N. Y.; Almacoa, Zurich, Switzerland.

tempted to alter existing methods.

A major difficulty resulted from the military necessity of decentralization of industry. Parts plants were spotted over various rural sections of France and these acted as feeder plants to the main motor, munitions, and gun assembly plants. This was necessary as a protection against air raids, but resulted in considerable confusion regarding the transportation of material and intercommunication between plants.

The military system itself was a definite interference with the manufacturing program. The draft was not selective. For many years every citizen had been required to serve for one full year in the armed forces of the country. When war came they were called up without regard to type of work or importance of position. In consequence, as rapidly as unskilled men were trained they were likely to be drafted away and new untrained workers put in their place. At the very last, children, old men and women were operating the machines in the factories and four million men under arms, lacking in proper equipment, were no match for small mechanized units.

The French government bought the very best types of English, Swiss, and American machinery it was possible to buy and along toward the latter part of the program cost was no item. The principal criticism that can be made and which was indirectly the cause of the collapse is that they did not start their mechanical preparation in time. Except for the difficulties mentioned in having our trained men called up for military service, things were just nicely getting under way from the manufacturing standpoint when the final collapse of the republic came.

False Sense of Security

This delay in getting under way with their preparedness program was in large part due to the fact that the people were lulled into a false sense of security behind their "Maginary" line. This line was impregnable from one side only and when the time came the Germans had only to break through the lowlands and take from behind all that the line protected. Most of the guns could not even be turned around and used to protect the rear.

When the great tank attack came the French had not a sufficient quantity of anti-tank guns between 21 mm, which were too small to be effective, and the 75 mm, which were too heavy to be maneuverable in battle against a moving target. I have been told by artillery experts in the French army that what they lacked most were guns of 37 and 50 mm. calibre. Such guns would have been heavy enough to use effectively against tanks and yet could be quickly transported and easily maneuvered.

As individual soldiers, no doubt the French were just as brave as any in the field but they did not have the right kind of equipment when the crucial moment came. The spirit of the people when, at last, war was declared was one of courage, though somewhat softened by contact with the popular front government from which they never recovered. At that time a number of the French officers going to the front told me they were "damned tired of picking up and laying down arms every six months and that this time we are going in there and fight this thing to a finish."

Even after the declaration of war, and for many months thereafter, the people failed to fully realize the danger of their position. It was on May 10th that the Nazi drive through Holland and Belgium began, yet as late as April Parisians felt so secure that in that month we joined an exclusive golf club north of Paris at which we were only able to play three times. The course then had eighteen holes, but since it was just across the road from a large airfield it seems more likely that it has a hundred and eighteen now. And it might be added that the worst duffer could make any of them in "one".

We Leave Paris

We saw very little military action when at last we left Paris, except, of course, the continual air raids, and even after the fall of Paris we did not think it certain or even likely that France would fall without a long and bitter struggle. We were sure that the scattered defense forces would be rallied on a lew line at the Loire river. We were merely transferring headquarters from Paris to Tarbes.

From a civilian standpoint the worst things about living in Europe during the war were the blackouts and the air raids. These were especially terrible during the last few months. When at last we left Paris on May 24th just one jump ahead of the Germans we encountered a nightmarish series of delays. Roads were jammed with the pathetic parade of refugees. They came on foot, on bicycle, in horse and cart, in old trucks and flivvers,—even in Rolls-Royces and Packards. Rich and poor, honest men and thieves, families broken up, all fleeing together down the crowded roads. Clothes and furniture and mementos from the Paris Exposition of 1889 filled vehicles and overflowed to the sides and tops of cars. Vehicles which had come from occupied territory were covered with camou-

The Carpenters on their honeymoon in France.
In the background is the Rhine River Valley and the mountains of Germany.

flaged devices of various kinds, the most successful, probably, fresh green branches of trees. I talked with any number of refugees who frequently had to leave their vehicles in the road and scuttle for cover in ditches and under trees during air attacks. We saw many cars and trucks that had been hit by machine guns and bomb splinters.

About a hundred and twenty miles south of Paris, at the town of Nevers, we were delayed for ten days by car trouble. During this time we had about a dozen air raids. We had as many as three in one day and it was a daily occurrence to hear machine guns and anti-aircraft fire and bomb explosions. However, nothing dropped any closer than two miles from where we were staying. At that time gasoline cost 80c a gallon and you had to have a special government permit to purchase it.

As I said when we first reached Tarbes we felt, as did everyone else, that the war would be long and drawn out. Accordingly we made plans to make this our headquarters, but things moved with such stunning rapidity that on June 10th we left Tarbes and went to Bordeaux to arrange final details for the trip home. We left there about the middle of June think-

ing that our passports and visas were in order, but upon reaching the border we were informed that we would need a special *sortie visa* in order to leave France. This we were told had to be signed by the prefect of police in Paris. Apparently it mattered little to the French border police that Paris was in enemy hands. The

A happy outing for a group of Hispano-Suiza Tool Engineers before the war. Later one entered the submarine service, others were in the army or became refugees at the last.

border officials wanted us to surrender our passports until this visa was received from Paris. This we refused to do and returned to Bordeaux. We found later that a great many American citizens lost their passports in this way and it was necessary for the Vice Consul to re-issue temporary ones.

When we returned to Bordeaux we found the town crowded by a million people, although the normal population would be about a quarter of a million. It was necessary for us to go thirty miles down the Gironde river to the little town of Largonne before we could find rooms. These were in a small hotel part of the time and in a French dressmaker's house part of the time.

Although there was no actual food shortage we did have to live on a peculiar sort of bread for two or three days at one time. The customary wartime regulations were in effect and there were three meatless days a week and alcoholic liquors were permitted only every other day. Pastry, butter, sugar, and coffee were also rationed.

We waited eighteen days while trying to straighten out the red tape that prevented our leaving the country. Our *sortie visa* was finally arranged for along with about two hundred other Americans by the American Vice Consul in Bordeaux, —Mr. Taylor.

Useless Petty Restrictions

It is hard to describe the confusion of those few weeks in and around Bordeaux. People of every nationality were seeking some means of coming to America, or at least of getting out of France into Spain or Portugal. The delay and inactivity were agonizing. We had about six different kinds of papers to keep in order, all of which had to be continually examined by various groups of officials in a specified order, each group being powerless to act until the preceding group had done its bit. This type of petty tinkering with little things and letting big things go must have had a large share in bringing about the final collapse of the French Republic. I do not wish to be unreasonably critical of the French people, and I admire the courage they evidenced throughout this crisis, but it must be admitted that they brought a lot of their trouble upon themselves, mostly by political and military interference with the normal manner of living.

When at last we secured our *sortie visas* we rushed down to the border at Hendaye only to find it closed again. This was our third attempt to get across the border. After some time it was opened briefly for the passage of citizens of non-belligerent countries and we were permitted to walk across the border into Spain. At that time no vehicles were allowed to cross and we were forced to abandon our car.

We had been anticipating trouble with Spanish and Portugese authorities, but little was encountered. These visas were ready more than three weeks before they were needed. After getting out of France we had to wait two days in Spain before we could secure train accommodations to Lisbon, and then a normal twelve hour trip required thirty-four hours. There was one last long delay in Lisbon waiting for the United States Liner Manhattan.

We were then a distance from Paris that in this country would have been no more than a two day drive. But it was thirty-two days after leaving that besieged city that we embarked for home.

There were large numbers of very strange looking citizens on the boat in possession of American passports, and we were reminded of the Americans who lost their passports at the border. When we arrived in New York all passports were collected and we were told that a strict investigation was to be made of all irregularities.

Blitzkrieg in Action

From the statements of eye witnesses who remained in the conquered territory after invasion we got quite a bit of first-hand information about the *blitzkrieg* in action. It is almost impossible to imagine the speed and efficiency with which the Nazis operate. A small group of them come into a town, confiscate all the arms, block all roads, and prevent people from gathering in groups. In this way a small group of armed soldiers can completely control a tremendous civilian population. A man is absolutely helpless if he isn't armed, can't go anywhere, and can't talk to anyone. When history finally tells us of the small number of Nazi soldiers that caused the collapse of France it will be amazing.

After the armistice was signed, the first edict to the French people from Hitler was, "Stay on your jobs, no matter what you are doing, keep doing it." There were apparently no civilian atrocities or pillaging of homes such as so frequently constitute the postlude of invasion. There did, however, appear to be a systematic confiscation of machinery, clothes, food, and other valuable materials whenever they could be conveniently sent back to Germany. It seems reasonable to suppose that much of the American machinery which France bought in recent months is now in Nazi hands.

Lesson for America

The purpose in making these remarks is not to amuse, entertain, or thrill you, but to bring home to our own citizens and engineers the deplorable conditions under which the civilian population must exist in a war ridden country. I am not going to take the extreme alarmist view which anticipates an attack upon the eastern coast of America, but you can be sure that these dictators are all alike and whatever one wants to do, the other will support him in it.

We must prepare a defense force the

like of which the world has never seen. None of us like the idea of forced conscription but we must have trained men, arms, munitions, machinery. It would be much better if we could have a volunteer army of highly paid men rather than unwilling conscripts. The war of today is apparently won by the highly skilled professional soldier who may be worthless in dress parades but is an expert technician who understands the problems of mechanized warfare.

The cost of such an army is unimportant. The world in which we live is not the world of 1939 or even the world of April, 1940. It has changed completely and rapidly and we must change with it if we would survive.

Money is worthless in a crisis. When we crossed the border into Spain we were able to change francs into a corresponding number of pesetas, about forty-four of which were worth a dollar as far as purchasing power was concerned. That day there was no restriction on the amount of money you could change at the border. The next day people were only allowed to cash a thousand francs each and by nightfall that had been cut to five hundred. There were millionaires who got on the train with us at the border who were penniless when they arrived in Lisbon. During that period the value of a thousand francs dropped from twenty eight dollars to forty cents.

When we got to Lisbon we had four kinds of money. We had French francs, an American Express Company letter of credit drawn on the Paris office, an American Express check and some American cash in bank notes. The French francs were practically worthless and even the American steamship line would not honor our letter of credit for passage money back home. If it hadn't been for the American bank notes we smuggled out of France we might still be in Lisbon seeking a way home.

Three Spheres of Influence

I am a pacifist at heart and I think like any democratic citizen, but we cannot tolerate in this country the apathetic type of thinking which caused the collapse of France and put England in its present difficult situation. The next time you hear someone raving about the cost of preparedness ask him what our wealth would be worth if anything should happen to the British navy and we were forced to fight a long war or accept a partial compromise or possibly defeat.

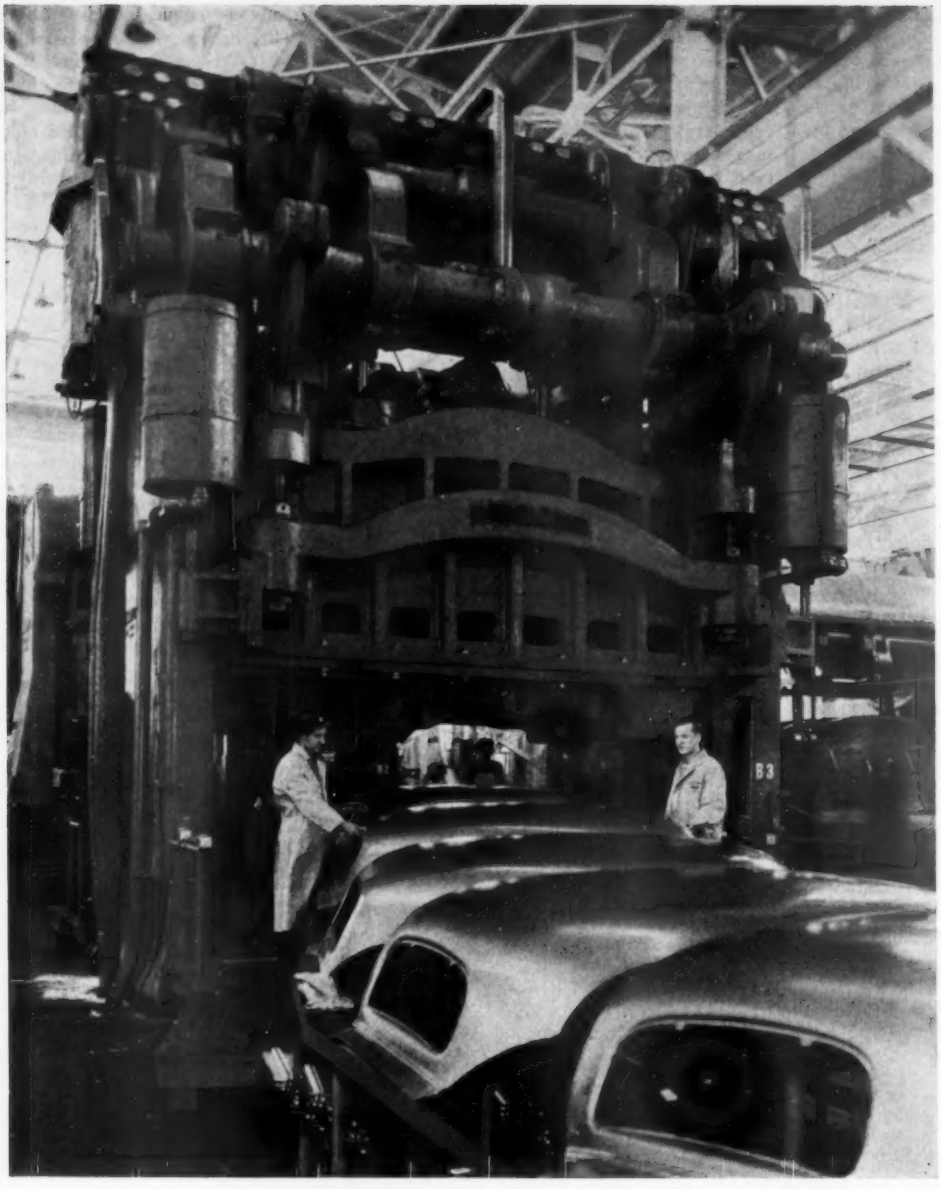
Should it happen that the battle for England results in a Nazi victory you will see Europe divided into three spheres of influence. There will be a Nazi area comprising central Europe, Poland, the countries already conquered and possibly the British Isles. You will see a Mediterranean or fascist group dominated by Italy, comprising southern France, Spain, Italy, and some of the Balkan states. Last there will be the Slav or Russian group comprising the rest of the Balkans, Russia, the Baltic states and possibly the Scandinavian states. We must realize the consequences of both possible military and economic cooperation on the part of these groups.

France and England knew years ago just what sort of tanks, what sort of planes, what sort of arms, what sort of armor would be most effective in the field. Sending a foot soldier out to meet a tank is like pitting a naked child against an armored beast. If you use more foot soldiers you don't destroy the tank you merely multiply the sacrifice.

We must cease striving for perfection in our designs and get into production upon equipment we know to be reasonably effective. Our researchers can continue striving for improvement but we must stop constantly delaying production to alter designs every time a bomb is dropped in Europe.

Above all we must recognize the task that lies ahead and settle down to do it for ourselves rather than expecting and hoping that someone else will do it for us.

The Carpenters after their return to the United States from their hazardous trip through war-ridden Europe. They paused in the act of unpacking their suitcases in order that "The Tool Engineer" photographer might get this picture.



A giant press stamps metal tops in a single stroke.

SINCE tooling, in spite of the latitude it provides for self expression and ingenuity among Tool Engineers, is largely controlled by the nature of the product, the price at which the product must be sold, the quantities in which it is made and the rate at which these quantities are to be produced, it might be well for us to look at the motor car with some of these characteristics in mind as a prelude to our subject.

While I may be biased, I believe that in spite of the fact that the modern motor car contains an example of the products of practically every known science, profession, craft, trade, process and material, it provides one of the greatest dollar for dollar values procurable.

This value, to my way of thinking, cannot be accounted for in volume alone or in any one of the hundred and one factors which enter into its design, manufacture and distribution. If there is any one secret, it probably lies in a planned yearly program of progressive manufacture and the highly developed coordination and timing of the facilities and processes required to carry out the yearly production program as planned. While I imagine that careful planning of production pays big dividends in any line of manufacture, it becomes a vital necessity to us in the automobile business—in fact, the very foundation of our entire manufacturing philosophy.

Inventory Storage—a Problem

We need only to think of the size and weight of the motor car, of the units from which it is assembled and the materials from which they are made to appreciate what our inventory storage problem would be if our plans were not soundly made and, once made, were not religiously carried out in every detail. To give you a picture of this situation, we estimate that if the entire floor space now occupied by the Chevrolet Motor Company were to be

Tooling for New Models

—in the Automobile Industry

By

RALPH L. LEE

General Motors Corporation

No industry finds its annual "program" so important, no industry provides so fertile a field for the Tool Engineer as does the automobile industry. Here is an inside account of what is encountered as the new cars take form.

devoted to the storage of finished motor cars it would store only fourteen days' production at normal schedules.

And this inventory problem, by the way, does not begin and end with our operations—it backs up to our suppliers of materials and extends on down into the domain of our dealers, to say nothing of the transportation channels through which these tremendous quantities of materials and products flow. In view of this situation we need little imagination to picture what jams in the main channels of production or bottle necks in the tributaries which feed them can do to our business and all who depend upon it.

So I think we can truthfully say that the one outstanding characteristic of our industry is the vital necessity of a meticulously planned and timed progressive flow of uninterrupted manufacture and distribution, starting from the mines themselves and continuing down through the entire process to the very garage door of the ultimate consumer. In other words, each year's production becomes a separate and distinct link in the chain of our business, with each new link forged and ready to be attached as the end of the old one comes up; and since time is required in the forging, our research, product, tool and process engineers spend most of their time working in their imaginations on the links to come.

Annual Changes

The principal reason for our business assuming the form of a chain instead of a continuous cable is due primarily to the seasonal motor buying habit acquired by the public. Granting differences of opinion as to the basic need or wisdom for such changes, the American public expects each year something new in a line of cars from which to choose. And while seasonal changes in product are not peculiar to the automobile industry, by any means, I believe that regular yearly model changes are peculiar to the manufacture of mechanical equipment as large, complicated and costly as the motor car. If the motor car, as a piece of machinery, were bolted to the floor in the basement and its use shielded from public view, then I doubt very much whether yearly model changes would be in order, but since the motor car is worn by its users like a suit of clothes as he struts on wheels before his fellow creatures, then, like wearing apparel, the motor car is subject to style and the periodic need for change.

So, with an annual model change as a fact, with a scheduled flow of uninterrupted and progressive production as a command, with tremendous production scheduled, involving as it does probably the greatest tonnage and variety of costly materials required for any product, a great aggregation of machine tool equipment, plants and facilities, and with some two hundred thousand factory employees plus tens of thousands of sales and service people, to say nothing of the vast army

A conference on preliminary body design.

required to supply materials and all the others who are dependent upon an uninterrupted flow of production—our product and Tool Engineers, and production people face one of the most challenging and comprehensive jobs of planning in industry today.

The "Program"

Each year, General Motors Tool Engineers are up to their necks in the tool planning program for a product that will not go into production until some twelve months later. And as a general rule, the design for next year's product is pretty well crystallized when this year's model is introduced. This means that a new model at the time of its public introduction is an old, old story to our product engineers for they are cleaning up the job on the next season's models and starting work on the products scheduled two years ahead.

The need for planning so far ahead of production becomes quite obvious when we consider the wide variety of complicated units which go to make up the final assembly of the motor car. With the due date set for the start of production and the vital necessity for this production flowing uninterruptedly, once it starts, it becomes perfectly obvious why we cannot gamble in our tooling program with untried, unproven or speculative processes and tools. There must be a sizeable safety margin or degree of functional surety in all our tool planning. This need becomes quite evident when we consider that the failure of one comparatively minor tool or process can become the bottle neck for an entire production division.

Now in my emphasis of the need for sure fire tool planning and building you may get the impression that our plans never back fire on us. Well, they occasionally do and, frankly, I can't picture a more realistic or fiery Hell than that in which we find ourselves when tools and equipment fail in spite of all of our planning.

Experimental "Production"

In fact, it is the memory of such experiences that drives us to our present conservatism. At first thought, such a conservatism might be looked upon as a barrier to progress. However, the progressiveness of the automotive industry, when it comes to tools and processes, belies this and suggests another possible peculiarity of our business. While we cannot afford to experiment with scheduled production, we do want the advantage of every worthwhile improvement in process, tools, equipment or material, so to protect production flow we must carry on our production experiments off to one side where they cannot interfere with regular production.

One of the best examples of an experimental tool and production project might be the one-piece turret top now popular throughout the entire industry. Forgetting for a moment that the one-piece top went into production with an entirely new body and in radical departure from the composite wood and steel bodies of the past, contemplation of this particular model change brought out the fact that presses suitable and of a size needed for blanking and forming tops did not exist. So, before experimental tooling could be carried on, you might say that experimental presses had to be built. This, in itself, was quite a contract. Next, sheets large enough for tops necessitated development work and new equipment on the part of the steel mills. Then we found that the dies of the size needed could not be handled with the machine tool equipment in our tool rooms, so this necessitated development work on the part of machine tool manufacturers. So we can say that tooling up for experimental tooling prior to tooling for production backed up into the plants of our suppliers.

After the new machine tools had been designed, built and delivered, our dies designed and built, sheets available from our friends in the steel industry and presses designed, built and delivered, we had lots of fun for quite some time trying to form one-piece automobile tops. In fact, over six months were required before tops were produced and the operations through which they were produced suited us to a point where we were willing to include them in our plans for regular production.

However, in spite of all this preliminary caution, the new top went into production for one line of bodies only—in fact, during the one season of producing this one line of bodies, we learned plenty —so much that we were not willing to include the one-piece turret top in all of our products until the next season. Now while such drastic changes in tools called for by the turret top and the all metal body do not occur every year, the story I have told will, I believe, give you an idea of the cautious way in which we must approach radical departures from tried and proven tool and production practices.

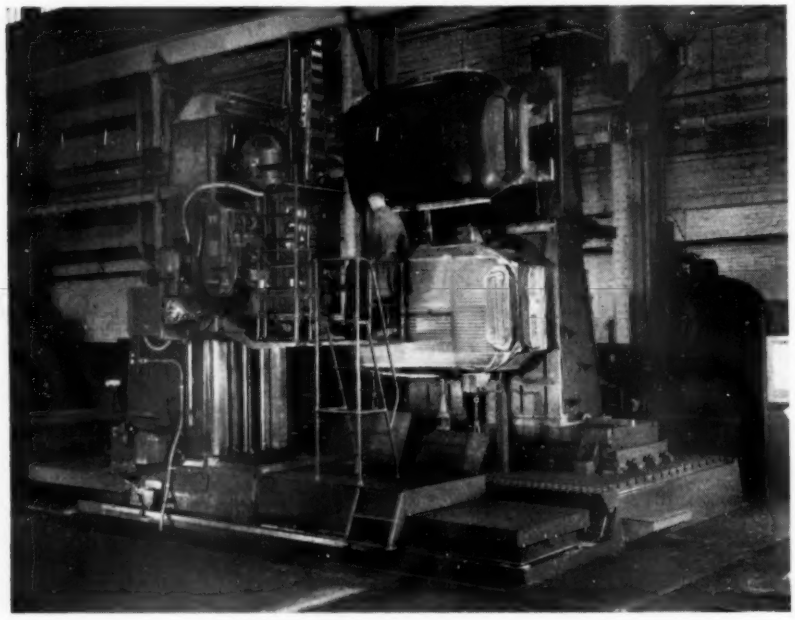
The cost of stoppages in scheduled production through the failure of tools or processes to function as planned can be so great to the entire organization that we cannot afford to judge the merits of a proposed tool, process or machine solely on the basis of the detail economy or improvement it promises.

Hazards of Special Machines

Stated another way: the volume of our production is large enough to make even a one-piece-per-unit detail a candidate, at least, for automatic special machine production. And I must say that having an almost irresistible inclination to invent and being addicted to complicated mechanical movements, I just itch to design automatic machines for many of the detail operations I see in my travels through our plants, now being carried on with conventional machine tools.

However, I know that we have learned from sad experience that, regardless of the detailed advantage promised through special purpose machines, the hazard of having our entire production dependent upon one special purpose machine requiring, let us say, one year to build and, when built, the only one of its kind in existence, is so great that we are compelled to move in this direction with considerable caution.

While this situation may cramp the style of the mechanical geniuses among our tool people, it does keep the old production wheels turning over. So, from



A Keller machine shaping a turret top die.

the standpoint of tooling for new models in General Motors, we lean toward standard tool machine equipment whenever possible and try to have as good a time as possible expressing our mechanical ingenuity and genius through the design of tools for standard and conventional machine tool equipment.

I need not tell you, who are so well versed and experienced in the field of tools, that a highly organized, coordinated and progressive production such as ours would be economically impossible without interchangeability of parts having been developed to a high degree. With a steadily moving assembly line and a system of synchronized flows of parts and materials geared in and feeding that line, we need little imagination to picture what a few bum fits could do to production. So accuracy becomes the law for all who have to do with the design of our products, tooling for them and their production. In fact, we have learned that quality must precede quantity and economy.

Before the "Tool Engineer"

In all humility, I don't believe there are many who appreciate this more than I do, for I spent over five years, many years ago, with a surface plate, index head, vernier height gauges, indicator, "mics," calipers and scales measuring parts and subassemblies of cash registers, making sketches and then assembling them all together on paper in layouts.

Setting new production records in 1939, the total production of the Automobile Industry for the past 40 years topped 79 million with average replacements now at 2,388,000 vehicles annually.

Prior to this time, we built our tools and carried on our production without a drawing or blue print in the place. Needless to say that our tool makers would occasionally, when something slipped, do a little bending or stretching on a model if it failed to exactly fit a finished die, jig or gauge. With this going on throughout the years, our models drifted considerably from their originals and this drift explains why our assemblers were equipped with reamers, peening hammers, lapping wheels, files, bending bars, and special hand tools of every sort; in fact, if I remember correctly, it took from two to three years' apprenticeship to make an assembler.

As I helped in the change from models to prints and the establishment of manufacturing standards and limits, I can appreciate the remarkable progress we have made toward the precision quality and quantity production so essential to us in our business today. So tooling for new models requires a thorough knowledge of the standards we have developed throughout the years and a profound respect for accuracy.

Since styling, as I mentioned before, is one of the principal reasons for annual model change, it might be interesting for you to hear how and when our Tool Engineers get in on the design of new bodies.

Unlike other apparatus as mechanical as the motor car, artists start the new design ball rolling, with sculptors immediately following in their wake. In view of the fact that artists and sculptors can do things on paper and with clay that might be quite difficult to mimic in sheet metal on a production basis, our Tool Engineers, of a necessity, must get into the creative picture at an early date and work hand in hand with the artists, forming a strange combination, if there ever was one. One glance at the sheet metal work on a modern motor car is proof enough that these strange partners have been working together and that the gap between what sculptors do with clay and the modern tool maker can do with sheet metal is narrowing at a surprising rate. Ten years ago such shapes would have been inconceivable to even the best in the tool making craft, and I might add that our metallurgists and the steel industry have played a most important part in this astounding progress.

To begin with, our body design artists first sketch up in realistic perspective their ideas and the accumulated ideas of the car divisions into candidates for the coming election. These candidate designs are then viewed from a style standpoint by those most importantly affected by style. Then to keep the stylists from going haywire, the Tool Engineers and production men who at times, by the way, are accused of having none too much art in their souls, are called in to take a crack at works of art. Designs which survive this treatment are then boiled down and choices are made.

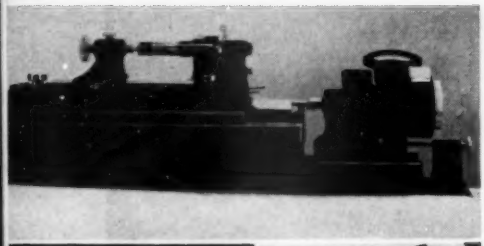
Full sized models of wood, chicken wire and clay are then developed. In the process of development, as problems of construction arise, our Tool Engineers and production men take an increasingly important part, and I might add that the artists make increasingly frequent concessions to the shop as time goes on. Finally, then, and as a result of many conferences and discussions which, by the way, at times become quite heated, the body designs crystallize, drawings are made, parts lists are compiled and the real fun for our tool people in the body division begins in earnest. So you can see from all this that part of the tooling for new models begins with the original design of a new product—two years before the date of scheduled production.

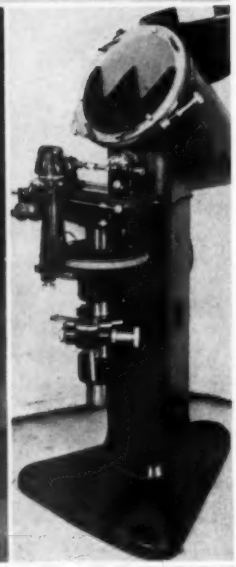
Even though I were qualified, time will not permit us to even enumerate the many items involved in the tooling up for new model engines, carburetors, air cleaners, fuel pumps, transmissions, radiators, electrical systems, head lights and the many other units which go to make up a new model motor car, for our production is in sufficient volume to permit a high degree of specialization in the tooling and manufacture of most of these units. In fact, the specialization provided affords groups and individuals the opportunity of concentrating all their skill and experience within comparatively narrow fields which, in my opinion, has been a most important factor in making the motor car the outstanding value it is today.

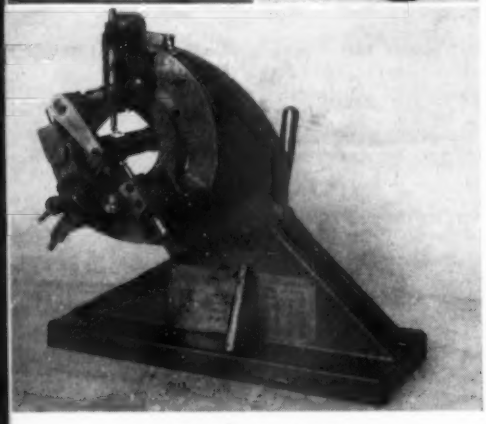
A sculptor working on a full-sized body model.

However, as important as specialization has been toward this end, I really believe that the organization and coordination techniques we have developed for directing the efforts of the many specialists required is of even greater importance and, particularly so, in the light of the timing so essential in meeting the schedules and dead-lines imposed upon us by the annual model change.

So, in conclusion, I would say that tooling for new models involves not only specialized mechanical knowledge and skill but a specialized knowledge and skill in the technique of working for, with and through all of the other people in the organization who must cooperate if new models are to go into production on schedule and come out of production on schedule, with the quality and economy necessary to the outstanding values the products must provide.







Thread Inspection Equipment
Top: Electrolimit Lead Tester
Center Left: Three-flute Tap Comparator
Center Right: Jones & Lamson Comparator
Bottom: Multiple Flute Tap Comparator

The American *Standard* for Taps

by
C. M. POND
Vice President
Pratt and Whitney Division
Niles-Bement-Pond Co.

Tap manufacturers, probably more than others, have been obliged to change more often and rapidly to keep up with modern conditions.

WITH the publication early this year of Standard B5.4, cut and ground thread taps entered the field of the ASA standards. This is the logical culmination of nearly thirty years of one of the most interesting developments in small tool history. As far back as 1910, the tap and die manufacturers realized that their product was anything but interchangeable. A number of manufacturers were furnishing the so-called "V" thread taps as a regular procedure and no two were working to the same pitch diameter figures. A great many sizes would be listed by one producer which were not shown in his competitors' catalogs. Briefly stated, each tap maker was a law unto himself although there was some uniformity as to styles of taps offered the trade.

One of the early investigations was for each manufacturer to send in fifty hand taps each of about twenty different sizes taken at random from his stock. These were carefully measured for lead error and a comparative table set up from which the first agreed upon lead error tolerance was adopted. This result was not finally accomplished until 1923 and in the meantime the work had attracted sufficient interest to warrant the publication of the first Standard Catalog for Taps and Dies in 1914. This Standard Catalog was subscribed to by most of the leading tap manufacturers and its inauguration abolished hundreds of oversize taps such as the 32nd oversize and 64th oversize tools which in those days were known as the "rough iron" sizes.

Among the pioneers in this standardization work were such men as Francis G. Echols, F. O. Wells, Frank Smith, Mr. Snow and Mr. Carpenter. Working with the facilities then at their disposal and dealing entirely with cut thread taps, they succeeded in bringing a certain amount of order out of chaos and the result of their early efforts can still be traced in a great many of today's standards.

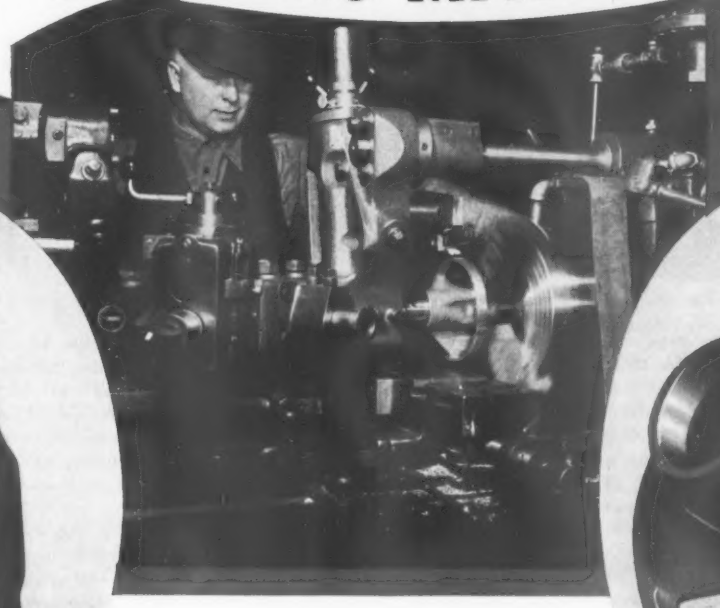
A standing committee was appointed to carry on this work and year by year this master catalog was amended and revised so that by the time the ASA appointed Technical Committee No. 12, a workable foundation was laid upon which the present publication is based.

Changes—Inevitable

Probably no industry has been obliged to change more often and more rapidly to keep up with modern conditions than the tap manufacturers. The advent of the National Screw Thread Commission, the introduction of ground thread taps, the rapid adoption of numerous alloys and increasingly wide use of gages and gaging equipment, have made almost annual changes imperative and the taps put out today bear very little resemblance to the tools of a generation ago.

Keeping pace with this development, we find the manufacturers of thread inspection equipment have brought their product to a state of perfection where minute errors are easily detected. Thread comparators and lead testing devices, representative cuts of which are shown in Figure 1, play an important part in keeping the tools in line with modern day requirements.

42% Time Saving with THIS TOOL on THIS MACHINE Making this PART



● In the shops of the Deming Co., Salem, Ohio, one of the country's oldest pump manufacturers, this job, a bronze internal bearing housing, was formerly produced on two turret lathes requiring 4.8 minutes per piece, without threading the large diameter.

Warner and Swasey engineers suggested using the new Adjustable Single Turning Head, with a special chaser and lead screw arrangement. The job, including threading, is now done *on one machine,* a No. 3 Universal Warner and Swasey. New time—2.8 minutes per piece, compared to 4.8 minutes formerly required, with 1½ hours saved in set-up time.

Why not find out what these new tools will save you? Write!

WARNER & SWASEY
Turret Lathes
Cleveland

YOU CAN TURN IT BETTER FASTER FOR LESS WITH A WARNER & SWASEY

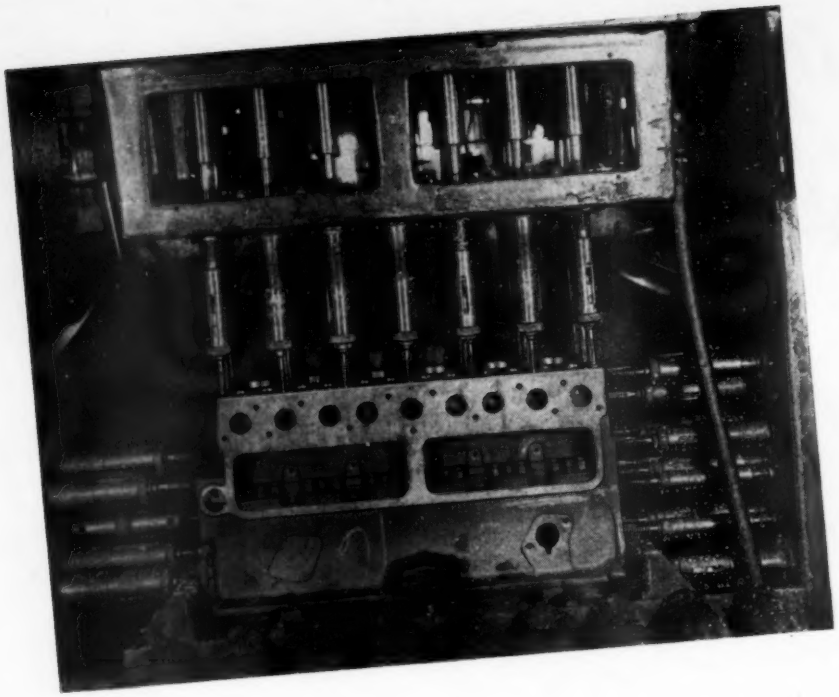


Figure 2.—Showing an example of hand taps being used in modern tapping equipment — in this instance they are employed in a multiple spindle machine, which calls for accurate standardization.

A heavy percentage of the taps sold today are the hand taps, and while these were designed primarily for hand use, yet modern manufacturing methods have adapted the tapping equipment so that they are employed in multiple spindle tapping machines and the necessity of accurate standardization will be apparent by reference to Figure 2 which shows nearly forty hand taps operating in a special fixture at the same time. The necessity for maintaining size and uniformity will be apparent. Even though carefully worked out standards have been established, special taps still constitute about sixty percent of the trade's requirements and Figure 3 shows some of the varieties which manufacturers are called upon to furnish.

Figure 3.—Showing some of the varieties of taps which manufacturers are called upon to furnish. Special taps still constitute about 60% of the tap makers' business.

Meeting Conditions

With the publication of the various classes of fit set up by the National Screw Thread Commission, tap makers were immediately called upon to make tools which would produce the class of fit adopted by individual customers but owing to the large number of variables which enter into the tapping processes, the tap makers have never been able to guarantee the size of the fit, particularly in the smaller diameters and finer pitches. This condition has been generally recognized and one of the subcommittees of the ASA are now working on this problem with a view to establishing tolerances which the average user can reasonably expect to obtain with taps now on the market.

Manufacturers of commercial nuts who have thousands of machines using the so-called bent shank tap have had a difficult problem in producing correct size nuts economically as there is bound to be a considerable variation due to this long established method of tapping. This method consists of revolving a bent tap in a specially designed chuck, allowing the nuts to continuously ride up the shank, around the bend and fall off into the hopper. This is illustrated in Figure 4 and it can be readily appreciated that the variables here introduced make extremely fine accuracy most difficult to obtain even with the best taps available.

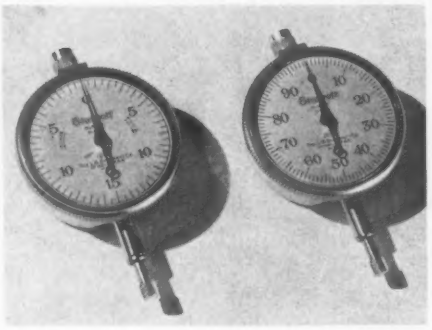
This new ASA standard contains comprehensive nomenclature and over forty pages of text and descriptive matter and yet there is not much question but what the next ten years will see still further refinements and changes brought about which will doubtless require a comprehensive revision.

In closing, the writer would like to express his deep obligation to the members of the Tap and Die Division of the Metal Cutting Tool Institute who have contributed generously of their time and experience to make this program a success.

Figure 4.—Tapping commercial nuts and maintaining accuracy is a problem not easily solved because of the unusual bent tap revolved in a specially designed chuck—described by the author.

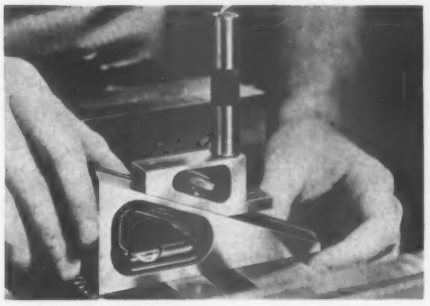
WHO SAYS YOU CAN'T RUSH PRECISION WORK?

STARRETT TOOLS



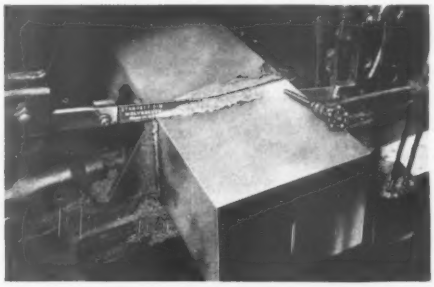
YES or NO... NOT MAYBE when you check with Starrett Indicators

The wide choice of models, types and dial calibrations available lets you pick the right Starrett Dial Indicator for any production measuring, testing or comparing operation. Fast, sensitive actions; big, easy-reading dials insure speed with accuracy. Also a large selection of LAST WORD Indicator models.



Save PLANER and SHAPER Time with this STARRETT Precision Gage

Make every first cut "on the nose" by setting planer or shaper tools with a Starrett No. 599 Shaper Gage. Used with a micrometer or caliper, it will gage with accuracy within its range of ¼ to 6½ inches. Alignment and parallelism of ends, sides and work contacts held to close limits. Use of angular slide ways eliminates lateral play. Note handy level.



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THE WORM TURNS

By
O. W. WINTER
Factory Manager
Columbus-McKinnon Chain Corp.

MOST of us have grown accustomed to recognizing the existence of sharp and complete reversals in our scheme of living. Love and hate share of the same bed and it is not uncommon that a man and woman will hate each other so much that they fall in love. The difference between genius and insanity is often a mere snap of the fingers. Such are what might be called natural but paradoxical reversals.

Man, however, is rather adept at manufacturing some of his own. The Nazis and the Soviets after calling each other all kinds of dirty names for years suddenly kissed and made up, at least apparently so.

We have in our own profession of Tool Engineering a similar and sizeable reversal. As late as last March at the A.S.T.E. Annual Meeting in New York City, Prof. John Younger, Chairman of the Fact Finding Committee delivered his third and final report on the work of that committee and showed conclusively that machines do not and have not caused unemployment except only of a very temporary character. Sixty days later we find ourselves out of the dog house and set up on a pedestal. We, Tool Engineers, who in the minds of many of our economists, politicians, and clergy were the ruthless creators of unemployment, have now certainly become the prospective saviours of the nation.

No thinking person today can question for a moment the necessity of Tool Engineers, of machine tools, of machinists and tool makers, and the indispensably vital part that they play in the role of national defense. For that matter no sound thinking person would ever question the importance of the Tool Engineer and of the machine as an indispensable means to economic progress during peace time. At the moment we might be called war babies, yet it seems to the writer that out of all this might come some good for the profession.

Tool Engineer—Key Man of Defense

I believe that more people today know more about the existence of and the importance of machine tools and men capable of operating and applying them than ever before. With understanding should come sound thinking and, provided crack pots don't spoil it, the Tool Engineers should, as a result of all this attention, move a few notches higher in social and professional status and in public opinion.

Judging from some recent displays of blissful ignorance on the part of the people that, in order to hold public office,

No thinking person can question the importance of The Tool Engineer today. The only question is one of how he can be of the most help.

should know something more than merely how to get votes, I believe there is certainly a great need for considerable education in many ways so that such questions as "What is Manganese?" "Is that chrome or ore" or "Is rubber a strategic war material?" might not have to be asked quite so often and answered by already overworked defense authorities.

After eight long years of condemnation of not only Tool Engineers and machines, but the manufacturing industry as a whole, we suddenly find our government wholly desirous of doing something about getting prepared. I hope and pray daily that we manage to get some real executives and engineers in authoritative positions to handle the job before it is too late. In the meantime the politicians can use their particular talent to advantage in making speeches and stirring up patriotic sentiment and last but not least keeping out of the way of the men who have work to do.

If we as Americans come through this thing with a whole skin, there are reasons to believe that there will ensue a reign of understanding wherein government understands business and business understands government, wherein college presidents, preachers and politicians understand and respect engineers, scientists and technicians and the latter in turn understands and respect the former.

Americans have a tremendous responsibility in the world today. We can't get to first base by calling each other names. This has been very successfully demonstrated for the past eight years and we all should be convinced of it by now. The present mobilization for understanding of private enterprise—a nation-wide program *of* and *by* manufacturers but *for* America should serve in a constructive way to eliminate misunderstanding which in reality is the basis of most antagonism. As American citizens, as Tool Engineers, as intelligent professional men we should support this mobilization of understanding just as we support the physical mobilization. Both are indispensable to national defense and to the keeping of what we have and need. Hence, not only does America have a tremendous responsibility in the world but it also has one internally. We cannot meet this world responsibility until we have met the internal responsibility successfully.

Our Government is suddenly interested in the training of apprentices. For years as a result of the discouraging effect of the last great depression the nation slumbered along and too many of our educators busied themselves in giving classical education instead of practical education. It has been said that there are a lot of good cement mixers in college. Now there is no point in sending a cement mixer to college. But there is still less point in giving a cement mixer a classical high school education. What should be done is to teach him how to mix cement. Then at least, he can earn a living when he gets out of high school, which too many of our high school graduates cannot do. There has grown in the minds of educators and, consequently, in the youth of this country

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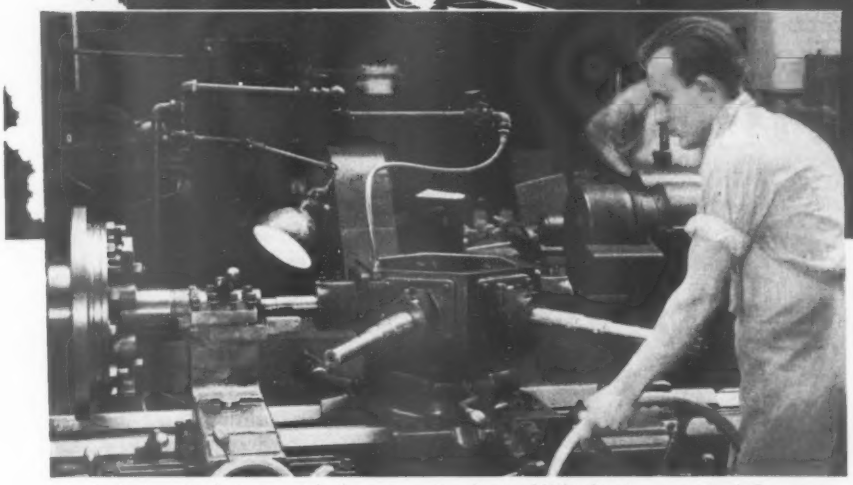
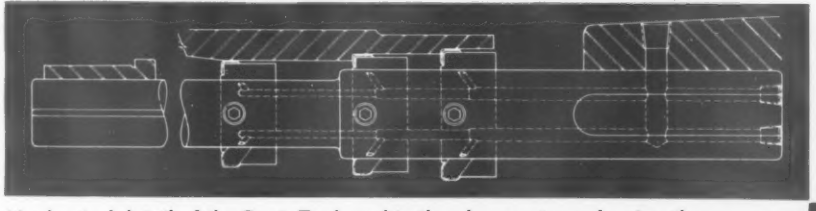
DAVIS BORING TOOLS Perform for WRIGHT AIRCRAFT ENGINES



Davis Boring Tools in turret lathe set-up in plant of Wright Aeronautical Corporation. These tools, in addition to incorporating our block type boring units, are also provided with internal lubricant lines leading to each set of cutters, thus bringing the lubricant to the point of cutting.

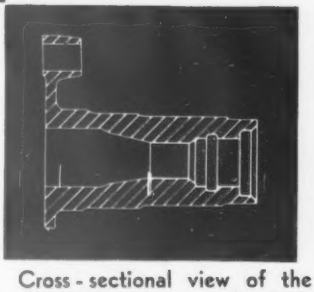
In selecting the tools for boring the propeller shafts of their famous Whirlwind and Cyclone Aircraft Engines, Wright Aeronautical Corporation naturally wanted the utmost in speed, accuracy and interchangeability. That's why they chose dependable DAVIS Boring Tools.



Mechanical detail of the Davis Tool used in the above set-up, showing the arrangement of the internal lubricant lines. Davis Tools constructed in this manner have proved both efficient and economical, throughout the Aircraft manufacturing field.

This Trade Mark is Symbolic of Speed, Accuracy, Interchangeability

DAVIS BORING TOOLS



Cross-sectional view of the Wright Cyclone propeller shaft which is efficiently bored by Davis Boring Tools.

Send us blueprints of YOUR special boring job, for a specific, helpful recommendation. DAVIS BORING TOOL DIVISION, Larkin Packer Company, Inc., St. Louis, U.S.A.

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THE WORM TURNS

(Continued from preceding page)

an attitude that it is dishonorable to get one's hands dirty even though it be an honest toil. Perhaps that is one way toward a more abundant life. This it seems to me is getting the cart in front of the horse. Far better to be able to earn that abundant life first.

Education for Defense

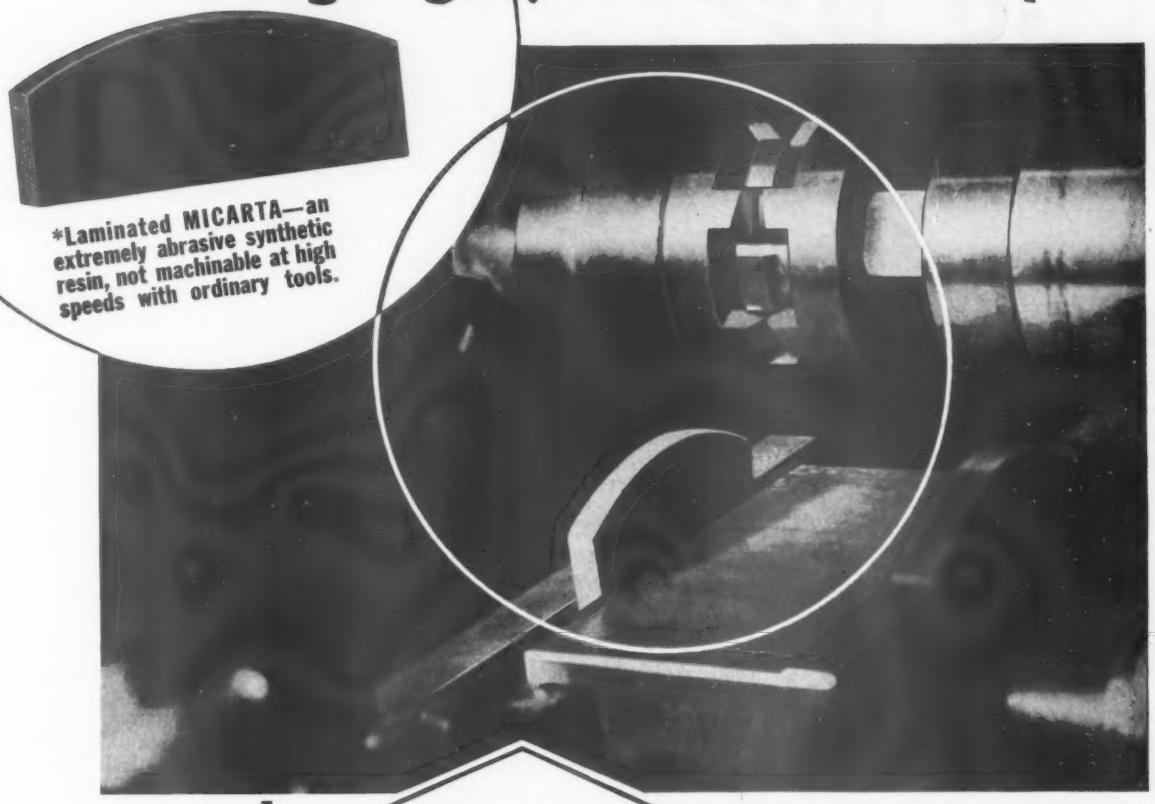
The American Society of Tool Engineers has an opportunity and a responsibility to play a very instrumental part in meeting the national emergency. We are the men who know what sort of education an apprentice should have. We are the men who know where skilled help is needed and how to evaluate and apply it. The Educational Committee of this Society is in a key position in this respect. This committee should find its work easier as a result of the current national interests in apprentice training. It is hoped, however, that there will not be any attempt at any master minding of the program from Washington with consequent bureacratic bungling, that is almost bound to occur if we can judge from experience. There will be needed, however, a definite cooperative arrangement locally between industry and educational authorities. There will also be needed a little less hard headed attitude on the part of some of our educators that a classical education is what a boy needs or that industry should foot the bill for apprentice training. They should be reminded again that industry already is and has been footing the bill for the support of our educational system by payment of local taxes and that as a result there should be a very sympathetic ear given to industry's requirements, particularly if industry offers to cooperate.

Let us gird ourselves for the task that lies ahead. Gird ourselves with understanding and cooperation without which there will be no accomplishment. As individuals, Tool Engineers, and citizens we who know what the task is can be invaluable in materially contributing to and seeing to its successful completion.

A Mobilization of Understanding

In our communities with our educators and in our plants with the management we make every effort to promote the training of machinists, tool makers, and Tool Engineers. With our civic, religious, and political leaders we can materially contribute toward the mobilization for understanding of private enterprise. In our particular sphere of engineering activity we, of course, are already contributing toward the physical mobilization of national defense. Today more than ever before in history the position of the Tool Engineer is all important. Let us merit, to the man, that position of importance and in so doing help save the nation and the world.

100,000 pieces per grind — milling highly abrasive* strips!



*Laminated MICARTA—an extremely abrasive synthetic resin, not machinable at high speeds with ordinary tools.

with FIRTHITE SINTERED CARBIDE TOOLS

PROBLEM:—To successfully profile-mill large quantities of highly abrasive laminated Micarta strips, that were unmachinable at desired speeds with ordinary cutters, and to eliminate the frequent down-time caused by tool failures.

SOLUTION:—The opposed, interlocking milling cutters were tipped with FIRTHITE Sintered Carbide.

RESULT:—FIRTHITE tipped cutters produced over 100,000 pieces between grinds, removing ⅛" to ½" of material **at 3600 RPM!**

MORAL:—FIRTHITE's remarkable capacity for mastering abrasive materials as illustrated by this typical case, leads to one definite conclusion: Ask a Firth-Sterling engineer to help you apply FIRTHITE to your difficult machining problems!

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Brief Reports on the very latest developments —New Equipment, materials, and processes.

Carboloy Record Chip Removal

A chip removal of 612 pounds per hour was obtained with two Carboloy tipped turning tools on a steel casting for a General Electric rotor spider hub. The cut was ¾ inch with a 1/16 inch feed per revolution. Chips were approximately one inch wide.

Before installation of these tools it had been necessary to stop every three or four revolutions due to breakage caused by blowholes and sand, while with the Carboloy tool, the cut could be taken the entire length of the riser before regrinding —a distance of 37 inches.

For further information write the Carboloy Company, Inc., Detroit, Michigan, mentioning THE TOOL ENGINEER.

New American Three-Way Broaching Machine

Several improvements have been made on the Three-Way Broaching Machine (T-24) of the American Broach and Machine Company. It can now be supplied with a retrieving mechanism which is hydraulically operated for handling the broach, thus permitting the operator to have both hands free for manipulation of the machine. The retrieving mechanism is mounted above the column of the machine, having its own slide and hydraulic cylinder, hydraulically controlled and timed, so as to operate in proper relation to the main operating cylinder.

For further information address American Broach and Machine Company, Ann Arbor, Michigan, mentioning THE TOOL ENGINEER.

Colonial Broach Machine Performs Several Operations

A number of machining operations on the same part are performed simultaneously on an installation in an automobile company by the Colonial Broach Company. The part in question is a shifter fork for an automobile transmission. Involved is the flat machining of three adjacent faces and the sinking of a large diameter radius contour into one of these faces.

The operations are performed on a single machine at the rate of 120 complete parts per hour by equipping the machine with two fixtures and two sets of broaches. The illustration shows the rough forged part at left. At center front it is shown after the first operation which is performed with the part in the left hand fixture. The finished part is shown at right after operation performed in the right hand fixture.

For further information write the Colonial Broach Company, Detroit, Michigan, mentioning THE TOOL ENGINEER.

Dalzen Combination Center Grinder & Drill Press

A Combination Center Grinder and Drill Press which features an exceptionally prompt and easy change-over from one use to the other is offered by the Dalzen Tool & Manufacturing Company. To change the machine into a drill press, the operator simply loosens one bolt, raises the dresser up to its full height, and swings it out of the way. This gives him a sturdy, accurate machine, capable of double use, at only a slight additional cost over that of the standard drill press alone.

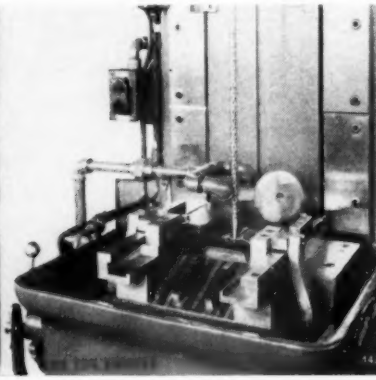
For further information write the Dalzen Tool & Manufacturing Company, 511 Leib Street, Detroit, Michigan, mentioning THE TOOL ENGINEER.

Seybold Precision Knife Grinder

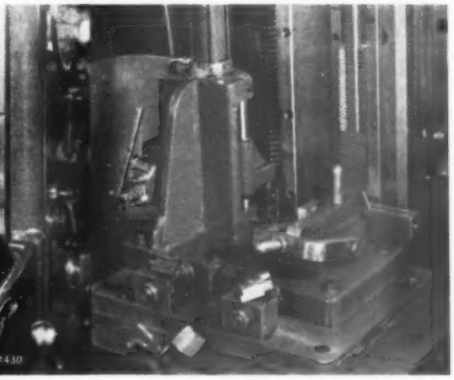
A newly designed 100″ Seybold Precision Knife Grinder is a high speed ma-

(Continued on following page)

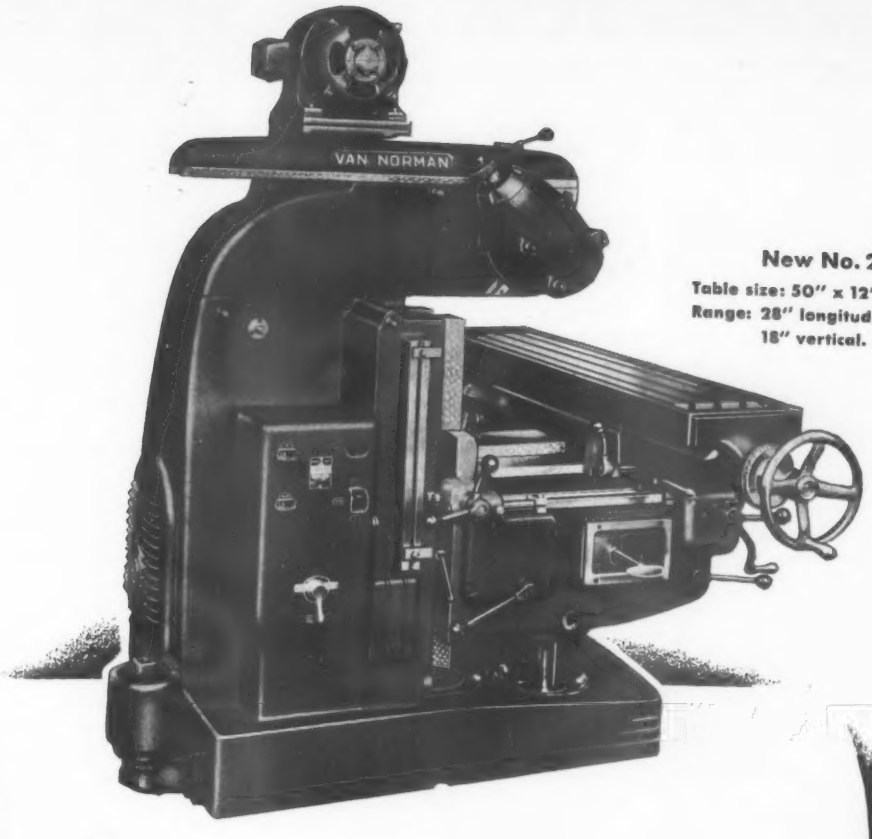
A chip removal of 612 pounds per hour was obtained with two Carboloy tipped cutting tools on this steel casting.



This American Three-Way Broaching Machine has a hydraulically operated retrieving mechanism, leaving both of the operators' hands free.



This Colonial Broach Machine performs a number of operations on the same piece at the rate of 120 parts per hour.



New No. 26
Table size: 50" x 12".
Range: 28" longitudinal, 12" cross, 18" vertical.

BUY a toolroom miller for the toolroom. Go from vertical to angular to horizontal milling thru the full run of the table . . . without disturbing the original set-up . . . without attachments. Front and rear directional controls of all power feeds, 6-way rapid traverse and a wide range of speeds and feeds provide flexibility, ease of operation and adjustment. In hundreds of toolrooms, contract, experimental, and pattern shops, Van Norman Ram Type Universal Milling Machines save man and machine time, increase output and lower costs. They will do the same for you. Five models to meet your needs, write today for Bulletins.

VAN NORMAN MACHINE TOOL COMPANY

Springfield, Massachusetts

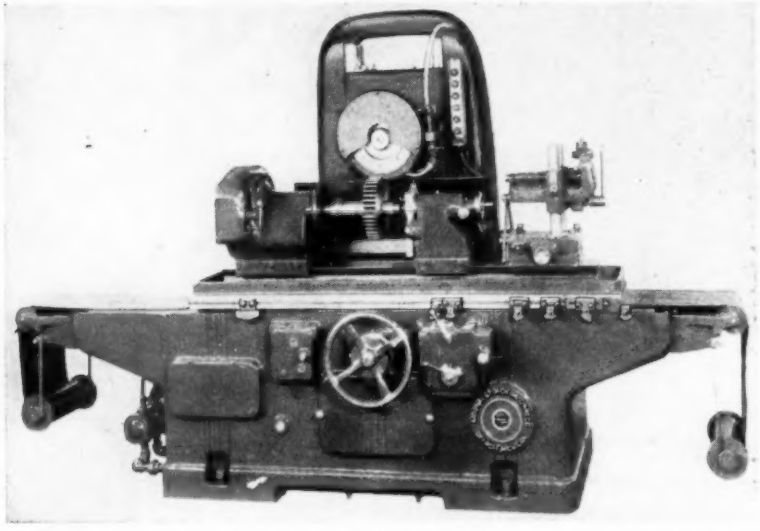
IT'S NEW

(Continued from preceding page)

chine with automatic grinding wheel feed and centrifugal pump cooling system. Removing an absolute minimum of metal, this grinder quickly produces a keen, true cutting edge that requires little honing, according to the manufacturer.

A unique feature is a hollow three-sided knife bar, each surface presenting a different series of angles to the action of the traveling grinding wheel. A fourth open side makes it easy to bolt or clamp various types of blades to the bar.

For further information write the Seybold Division, Harris-Seybold Potter Company, Dayton, Ohio, mention THE TOOL ENGINEER.



This new Red Ring Gear Grinding Machine of the National Broach Company has a spindle slide with hydraulic counterbalance and a table slide which is hydraulically reciprocated and automatically controlled.

Red Ring Gear Grinder

Developed originally to meet needs for precision grinding of master gears and involute broaches a new Red Ring Gear Grinding Machine of the National Broach and Machine Company, Detroit, Michigan, is said to have all the advantages of other grinders and to be without many of their disadvantages.

The spindle slide is adjustable up and down by a hand wheel. Hydraulic counterbalance removes all backlash from the lead screw. Operation of the down feed against hydraulic pressure eliminates possibility of the head sticking when small increments of down feed are required.

The table slide is hydraulically reciprocated and automatically controlled through a feed box mounted on the front of the machine. Table speed is controlled to a high degree of precision.

Grinding time is greatly reduced when gears are shaved before hardening and grinding; lapped afterwards. In one instance, a twelve inch diameter by two inch face gear, the normal grinding time of sixty minutes has been reduced to a combined grinding and lapping time of twenty minutes; and shaving requires less time than the finish cutting operation which it eliminates.

For further information write the National Broach and Machine Co., 5600 St. Jean, Detroit, Michigan, mentioning THE TOOL ENGINEER.

Ozalid Whiteprint Machine

Featuring a newly developed high pressure mercury vapor tube which uses forty watts per inch and provides uniform distribution of light over the entire printing area, a new fast-printing Whiteprint machine will print up to 56 inches per minute.

Model "F" of the Ozalid Corporation, this mercury vapor tube cuts electrical consumption as much as fifty percent over machines of equal capacity using arc lights. The tube has a guaranteed life of 1000 hours but has an expected life average 2000 hours. When it burns out the tube can be reworked for considerably less than the original purchase price.

The original and sensitized materials are brought into exposure by carrier belts which hold them against a 4½" diameter pyrex glass cylinder. This cylinder is suspended at each end on three ball bearing rollers and is revolved around the stationary high pressure mercury vapor tube by contact with the carrier belts.

An adjustable light shade allows the operator to vary exposure within certain limits without changing the printing speed. Thus prints are handled efficiently with a smooth flow of work maintained despite variations in transparency of tracings.

A newly developed high pressure mercury vapor tube is included in this new Ozalid Whiteprint machine.

For further information send for Model "F" circular from Ozalid Corporation, Ansco Road, Johnson City, N. Y., mentioning THE TOOL ENGINEER.

Atkins Curled Chip Cutting

An entirely new line of power metal cutting saws identified under the general term "Atkins Curled Chip System of Metal Cutting" is announced by E. C. Atkins and Company. The distinguishing mark of these new power saws and the feature primarily responsible for their improved performance is new and different tooth. This tooth, formed with an inward curved cutting edge, produces a curled, clock-spring-like chip in cutting. Like a well ground lathe tool, its cutting edge bites into the material to be cut at a slight angle, lifting the chip and keeping it rolling as a single piece within the curved contour of the gullet. When the tooth reaches the end of the kerf, the curled chips leap free like a released spring. No broken chips are carried through the cut a second time to jam in the gullet or retard cutting action. Such self-cleaning is said to make heavier feeds and faster cutting speeds entirely practical.

Samples of the chips produced with the Atkins curled chip method of cutting.

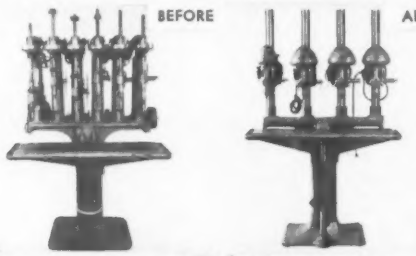
For further information write E. C. Atkins and Company, 402 S. Illinois Street, Indianapolis, Ind., mentioning THE TOOL ENGINEER.

BINKS MFG. CO., Chicago . . . Two 8-spindle units in this plant use the new Delta sectional table, which provides a table of any length and any number of heads—at minimum cost. Rolling seat for operator increases efficiency; speeds production.

KEARNEY AND TRECKER CORP., Milwaukee . . . This 16-spindle Delta set up speeds production of famous milling machines. In addition to drill presses, this plant uses Delta Tool Grinders and cut-off machines.

SCHULTZ DIE CASTING CO., Chicago . . Two 4 spindle 14 units are used here for drilling, threading, tapping and spot facing Delta disk and belt sanders, grinders and band saws also play an important part in their production.

ALEMITE DIE CASTINGS & MFG. CO., Woodstock, Ill. Delta drill presses are used almost exclusively here for drilling and tapping automotive trim parts. Note how one head is inverted which considerably reduced fixture cost



70% OF ALL PLANT EQUIPMENT OUT OF DATE

Modernize your "cripples" this simple way, by replacing worn out spindles with new, modern Delta drill press heads and columns at surprisingly low cost.

BREAK UP THAT BOTTLE NECK!

INCREASE YOUR PRODUCTION
WITH DELTA INDUSTRIAL MACHINE TOOLS

When there is an urgent need for quick expansion, reduced costs, increased production—thousands of manufacturers have found Delta low cost machine tools the answer! These amazingly efficient power tools—drill presses, cut-off machines, grinders, sanders, band saws —are flexible and versatile enough to fit your special requirements. They can be used for straight line production in any number of combinations, as auxiliary tools to augment your present equipment —for special setups to eliminate costly special purpose machines. They are portable and compact and can be switched around quickly to fill changing needs. Best of all—you can get immediate delivery RIGHT NOW!

DELTA INDUSTRIAL MACHINE TOOLS

You can get *immediate delivery* on these Low-Cost Machines

Don't let the low prices of Delta tools fool you. These rugged, accurate tools have a place in your plant right now. They can help you in scores of ways to solve difficult production problems that confront you. They have done it—are doing it—for some of the shrewdest manufacturers in this country. You should investigate these tools carefully—and get the complete story of their remarkable accomplishments.

Send for Complete CATALOG

Fill out the coupon—mail to us for the latest catalog of Delta Industrial Power Tools—giving prices, specifications and available accessories.

DELTA

INDUSTRIAL MACHINE TOOLS

The Delta Mfg. Co., (Industrial Division)
615 E. Vienna Avenue, Milwaukee, Wis.

Please send me catalog of Delta Tools, giving specifications and prices.

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THREADS ARE WORKERS

As soon as they are cut, they are ready for their job of holding - - No threads work better or last longer than the clean, accurate threads cut with Morse Taps and Dies.

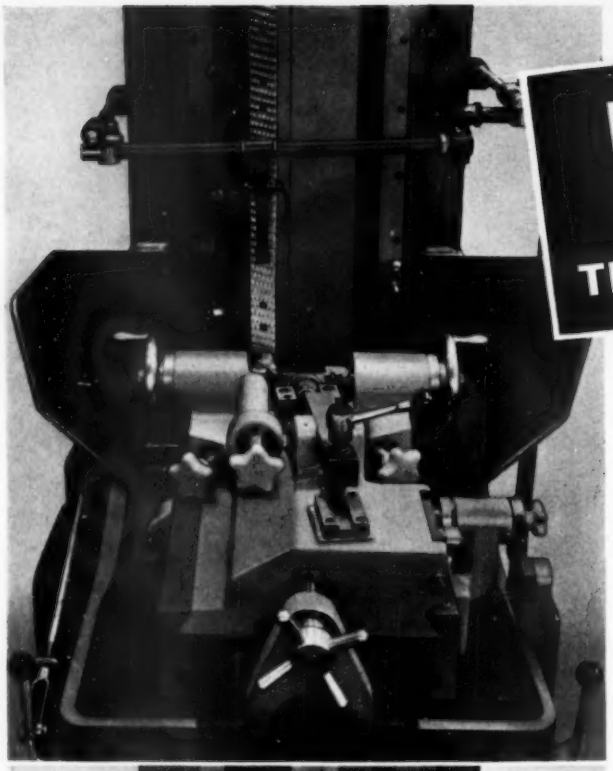
MORSE

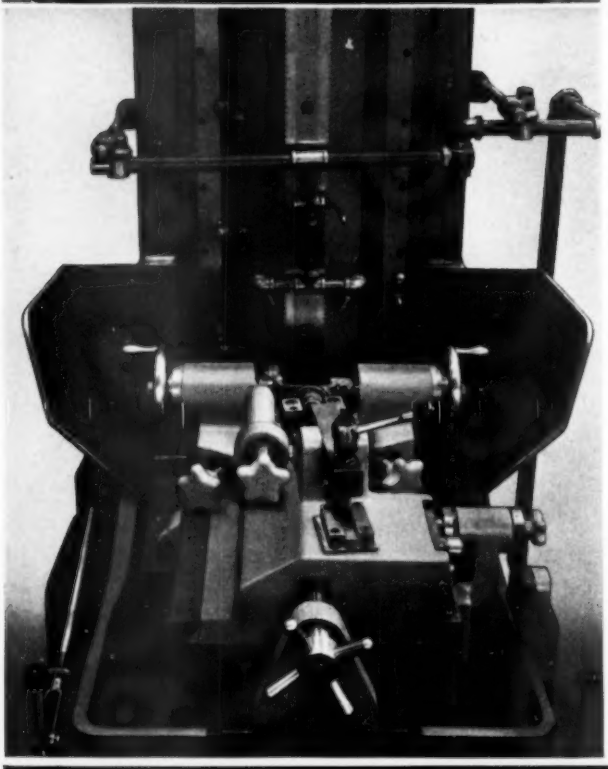
THERE *IS* A DIFFERENCE

TWIST DRILL AND MACHINE COMPANY

NEW BEDFORD, MASS., U. S. A.

NEW YORK STORE: 130 LAFAYETTE ST. - - - - CHICAGO STORE: 570 WEST RANDOLPH ST.





IT'S A CINCH TO CHANGE THESE BROACH SET-UPS

SURFACE broaching can now be applied to relatively small quantities of parts. It's done every day on CINCINNATI Vertical Hydro-Broach Machines, chiefly because they have an exclusive interchangeable broach holder arrangement that minimizes set-up time.

For example, the above illustrations show two different set-ups on one CINCINNATI No. 10-66 Single Ram Vertical Hydro-Broach Machine. Three fixtures were designed to hold five different steering knuckles. Four broach holders complete the equipment.

Each of the five parts requires two operations and some of them require three cuts to complete an operation. Change-over or resetting may be accomplished by merely loosening the clamps at the side of the broach holder, changing the holder, and resetting the fixture.

Set-ups may be changed in less than an hour, and production varies from 45 to 96 parts per hour, depending upon the part and the number of cuts.

Perhaps many parts in your own shop can be broached more economically on CINCINNATI broaching equipment. Why not start your survey now by writing for catalog M-886.

CINCINNATI

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI GRINDERS INCORPORATED

Manufacturers of
Tool Room and Manufacturing Milling Machines
Surface Broaching Machines · Centertype Grinding Machines · Cutter Sharpening Machines
Centerless Grinding Machines · Centerless Lapping Machines

Production Perspectives

News of Mass Manufacturing from Everywhere

AS was predicted in this column last month it has been officially announced by the Ford Motor Company that they are proceeding with plans for the construction of airplanes. About a hundred thousand dollars has already been spent upon research and design work. The plane will be powered with a liquid cooled V-type motor similar in construction to the present twelve cylinder Zephyr motor. This will mark an additional milestone in airplane production inasmuch as Ford can be counted upon to contribute much to the field now that he is in it again.

Inasmuch as an army P-38 was loaned to the Ford Company last June for study it is expected that the design will be along this general line.

It has also been announced that Ford will make 4000 Pratt and Whitney motors for the government. These will not, however, influence or interfere with the airplane construction.

REPORTS of earnings for the first six months of 1940 were issued by most companies by the end of last month. In the capital goods industries earnings were up on the average to about three times what they had been in the first six months of 1939. They were down somewhat from last fall but this was primarily due to larger tax and depreciation reserves.

Vacation schedules sent the National Machine Tool Builders Association operating rate down from 92.3 per cent in June to 88.3 per cent in July.

The Federal Reserve System began releasing index numbers based upon a new set of calculations which included 23 new series and their indexes of industrial production were transferred to a new base of 1935-39 as equalling 100. The general effect of the new index was to indicate that conditions were much better than the former index had been showing. The explanation lay in the fact that the old index had become antiquated as new types of industries grew and prospered.

THE Hartley Wire Die Company has moved from Waterbury, Conn. into larger quarters at Thomaston, Conn., increasing the available floor space by about 15,000 square feet. The company, producers of tungsten carbide dies for drawing, sizing and extruding purposes, recently celebrated its 90th anniversary, and is said to have been the first organization in this country to make diamond dies.

Following the lead of many other large and small firms in this vicinity, the Van Norman Machine Tool Co., Springfield, notified Capt. Warner B. Sturtevant, adjutant of the local 104th Infantry National Guard, that employees will be assured of their jobs and compensation during field training. The men will get $3 a day for three weeks from the company while in the field the notice said.

The Snell Manufacturing Co., Fiskdale, makers of bits and boring tools, which has been closed for six weeks, has been purchased by new interests and reopened. Dwight E. Priest of Worcester, president of the Parker Wire Goods Co. of Worcester, is one of the new owners.

The Fitchburg Grinding Machine Corp., has orders totaling $250,000 for machinery to be used in aircraft engine production, most of it by the Rolls Royce Co. of England. One hundred and twenty skilled machinists and machine operators will be employed at the Walnut Street plant and the order must be completed by February 1941.

AN obstacle has been encountered by the Springfield Bronze and Aluminum Company in its plans for building an addition to its plant in Springfield through the absence of a provision in the building code to allow variations without the necessity for action by the appeals board or the city council. The company seeks to build an addition in quick time so that the additional space will be ready by October 1 for machinery and workmen on war orders.

The Progressive Tool & Die Co., Worcester, which manufactures dies for die castings and forgings, recently added new equipment and floor space to accommodate increased business. After acquiring 1,000 square feet of additional floor space the company completely rearranged the plant setup to obtain more efficient production.

Repair shops of the Boston and Maine Railroad at Billerica, Mass., and at Concord, N. H. which usually close for vacation periods in August remained in operation this year during that month.

The Stacy Machine Works, which has been located for years in West Springfield has completed moving to new quarters in Springfield, in a two-story building owned by Bemis & Call. President R. S. Carroll of the Stacy works said that an increase in business has necessitated the employing of more men and the purchase of new equipment and that the concern outgrew its West Springfield quarters.

The contract for the construction of a new shop and laboratory at the United States Armory, Springfield has been negotiated with Charles T. Main Company of Boston and construction operations will begin immediately.

WHILE in past years the East Springfield plant of the Westinghouse Co. generally has been reducing production at this season, this summer finds output being continued at a high level with no reduction yet in sight. The mechanical refrigerators are being sold as fast as they are being made and sales of air conditioning equipment also are heavy. The payroll at the East Springfield plant has been at 3,100 for several months, making it second only to the U. S. Armory in Springfield.

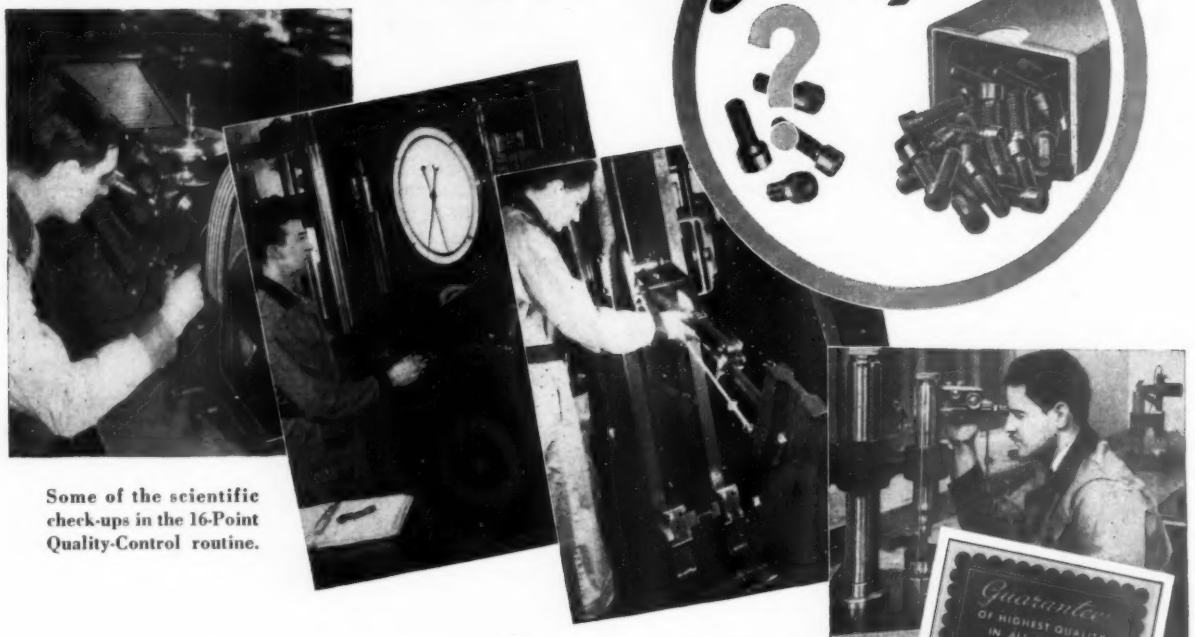
Working at near-peak capacity Smith and Wesson Inc. of Springfield, arms manufacturers, has begun production of a large order of automatic revolvers for England. The order, one of the largest placed through foreign agencies, has required an additional shift of workers. Harold Wesson, president said peak production is expected to be reached in the near future. Smith and Wesson engineers are working on a new type machine gun scheduled for production soon.

Distribution of a $735,120 dividend to stockholders of Jones & Lamson Machine Co. of Springfield, Vt., was revealed by a certificate and affidavit filed in the office of the secretary of state by Ralph E. Flanders, president and other directors of the company. The papers were submitted following filing last week of an amendment to the corporation's articles of association which changed the authorized capital stock from 30,000 shares of $100 par common to 150,00 common shares of $20 par value.

THE National Defense Advisory Commission has approved Army and Navy contracts for almost $2,000,000,000 since it went to work on the rearmament program in June, an offi-

UNEQUALLED CHECK-UPS

eliminate the "Doubtful Few"



Some of the scientific check-ups in the 16-Point Quality-Control routine.

. . . when Parker-Kalon's Quality-Control Laboratory backs your fastening devices

You get an unequalled protection against time-wasting, cost-boosting "duds" among your fastening devices when you specify Parker-Kalon! For, in Parker-Kalon's plant, an unusual Quality-Control Laboratory stands guard over all production, to eliminate the "doubtful few" screws that slow-up assembly work and produce unsatisfactory fastenings.

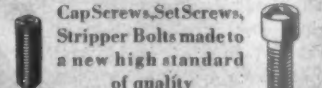
Without counterpart in the industry, this scientific Laboratory sets standards of quality that could never be maintained without rigid quality-control of every production step from chemical analysis of the metal to micrometric check-up of finished dimensions. It insures that every Parker-Kalon Fastening Device is more than "good enough" in both accuracy and strength.

Take no chances in your assembly jobs . . . buy Hardened Self-tapping Screws, Socket Screws or other fastening devices that are made in the screw industry's most modern plant. Parker-Kalon Corporation, 190-198 Varick Street, New York.

COSTS NO MORE *to get this Parker-Kalon Quality-Control Guarantee with every box of . . . .*

Hardened Self-tapping Screws
Types, sizes, head-styles for every assembly of metal or plastics

Cold-forged Socket Screws
Cap Screws, Set Screws, Stripper Bolts made to a new high standard of quality



Wing Nuts-Cap Nuts-Thumb Screws
Cold-forged . . Neater, Stronger

SOLD ONLY THROUGH RECOGNIZED DISTRIBUTORS

Quality-Controlled **PARKER-KALON Fastening Devices**

PRODUCTION PERSPECTIVES

(Continued)

cial tabulation showed Aug. 16. A summation by William S. Knudsen, the commission's production chief, showed that the agency cleared contracts totaling $1,961,741,122 since June 6. Of the amount, $1,434,947,219 went to the Navy, principally to speed its huge shipbuilding program, and $526,793,903 for Army materials including planes, tanks and guns. Defense experts pointed out that only contracts of $500,000 and over are "cleared" or approved by the commission. Smaller contracts awarded since June 6, they said, would push the total past $2,000,000,000, probably closer to $2,250,000,000. The fact that the commission "cleared" the contracts, they said, does not mean that they have been officially awarded. Contracts for major segments of the 4200-plane program for the Army and Navy, it was explained, already have been "cleared" but most of them have not been awarded officially pending congressional enactment of more liberal plant amortization laws in the excess profits tax bill.

A newly developed bomb release, designed to drop bombs automatically so that they will strike the earth at any preselected distance apart, has just been perfected by the research engineers of the Glenn Martin Co. at Baltimore. Using such a bomb release a fleet of fast dive-bombers could bomb a whole city so that one explosive hit would not overlap another. The control is operated by the engine of the ship through an electric circuit.

THE Hudson plant in Detroit has its assembly lines turning out 1941 models at a rate that will mean an output of $20,000,000 worth of cars by the end of August. The new models now are running off the lines at the rate of 600 a day, with a further stepup now being scheduled.

A. B. Einig, general manager of the Motch & Merryweather Machinery Co. of Cleveland, has been appointed a member of the important machine tool division of the National Defense Advisory Commission. Einig, whose appointment came from William S. Knudsen, production chief of the commission, has been associated with the Motch & Merryweather concern for about 30 years. In the last war, Einig, a graduate of Case School of Applied Science, served the War Industries Board in an advisory capacity.

The Warner & Swasey Co., Cleveland, operated since its establishment in 1880 as a privately owned concern, will be incorporated and will make a public offering of its shares if a recapitalization plan to be submitted to a special meeting of the stockholders August 20 is adopted. According to Charles J. Stilwell, president, who has outlined the recapitalization plan in a letter to stockholders, it is proposed to increase the common stock from an authorized $300,000 shares of $5 par value stock, of which 248,245 shares are outstanding to 1,000,000 shares of no par and to convert the present shares for the new stock on a three-for-one basis. If the plan is adopted, Stilwell's letter explained, 13,502 shares of 6 per cent cumulative preferred stock will be retired this year. Stilwell and other senior executives who have been identified with the company's progress for the last 20 years will remain in charge of management and operation.

Factory sales of cars and trucks in the first seven months of this year showed a 22 per cent gain over the corresponding period 1939, according to estimates of the Automobile Manufacturers Association. Production in the current period totaled 2,776,740 units.

July was the seventh consecutive month in which sales were ahead of the corresponding 1939 month. Factory sales in July totaled 237,300 units, an increase of 9 per cent over the corresponding month of last year. Reflecting the usual cessation of production during the change-over period, last month's sales were 35 per cent under June.

O.Z. COUNTS ON P-K FOR THE "SQUEEZE"

AVOIDS "DOUBTFUL" SCREWS BY USING QUALITY-CONTROLLED PARKER-KALON SOCKET SCREWS

Great pressure is required in making this electrical connection permanently secure. It is no job for "doubtful" socket head cap screws. That's why O. Z. Electrical Mfg. Co., Inc. specifies PARKER-KALON and says: "The exceptionally high tensile strength more than meets our unusual requirements . . . tremendous pressure does not damage the socket . . . unvarying uniformity of dimension satisfies our own close tolerances."

Every manufacturer who seeks maximum protection against the troubles which may be caused by a few "doubtful" – imperfect – screws in a lot, is sure to be interested in the unique Quality-Control routine under which Parker-Kalon Socket Screws are produced.

WRITE FOR FOLDER AND SAMPLES – read about this routine and the amazing Parker-Kalon Laboratory which makes it possible to maintain a new high standard of quality in socket screws. Free samples and local distributor's name will also be furnished. Parker-Kalon Corporation, 190-198 Varick St., New York, N. Y.

Quality-Controlled

16-point test and inspection routine covers: Chemical Analysis; Tensile and Torsional Strength; Ductility; Shock Resistance under Tension and Shear; Hardness; Head diameter, height and concentricity; Socket shape, size, depth and centricality; Class 3 Fit Threads; Clean-starting Threads.

PARKER-KALON
COLD-FORGED
Socket Screws

New Literature

Of Interest to the Tool Engineer

"Hy-Power" Hydraulic Riveting, Punching and Pressing Equipment (28 pp) is the new Bulletin, Number 53, of the Hannifin Manufacturing Company. This bulletin describes and illustrates a wide range of "hy-power" hydraulic equipment for riveting, punching, pressing and similar operations. Included are descriptions of multiple piercing and riveting units.

For a free copy of this bulletin address the Hannifin Manufacturing Company, 621-631 South Kolmar Avenue, Chicago, Illinois, mentioning THE TOOL ENGINEER.

Eight Different Jobs Show Doall Advantages Over Eight Basic Cutting Methods (4 pp) is a recently published folder of Continental Machines, Inc. This folder shows by actual photographs the comparison of the Doall Contour Sawing Method of removing metal with such conventional machining methods as shaping, turning, milling, nibbling, and torch cutting.

For a free copy of this folder address Continental Machines, Inc., Dept. TE-8, 1304 S. Washington Ave., Minneapolis, Minn., mentioning THE TOOL ENGINEER.

●

Spotlighting Hidden Plant Capacity (20 pp) is the title of a new booklet issued by the Carpenter Steel Company. This new booklet points out a method of getting more output from present production set-up, and is therefore of unusual timeliness and interest to those confronted with the necessity for speeding up or expanding capacity.

For a free copy of this booklet sent anywhere in the United States, address Carpenter Steel Company, 122 Bern Street, Reading, Pa., mentioning THE TOOL ENGINEER.

●

Cold Rolled and Cold Drawn Specialty Steels (12 pp) is a new folder published by the Crucible Steel Company of America. The tables have been simplified by the exclusion of matter which does not apply to the higher carbon quality steels. Weight per thousand feet of Cold Rolled Spring Steel, hardness conversion numbers and decimal equivalents for various thickness gauges are included for ready reference.

An interesting feature is a list of steels as they are known to various trades by distinctive names or purposes. Method of manufacture is mentioned briefly with special reference to the finishing of Tempered Spring Steels.

For a free copy of this folder address Crucible Steel Company of America, 405 Lexington Avenue, New York City, mentioning THE TOOL ENGINEER.

●

Cut Steel Profitably with Kennametal Tools and Blanks (6 pp) is a new folder published by McKenna Metals. It contains factual data on this new hard carbide tool material. Three tables describe (1) the comparative physical properties of Kennametal, (2) materials machined with Kennametal and (3) recommended speeds for machining steels of various hardnesses.

For a free copy of this folder address a request upon your company letterhead to McKenna Metals Co., 600 Lloyd Avenue, Latrobe, Pa., mentioning THE TOOL ENGINEER.

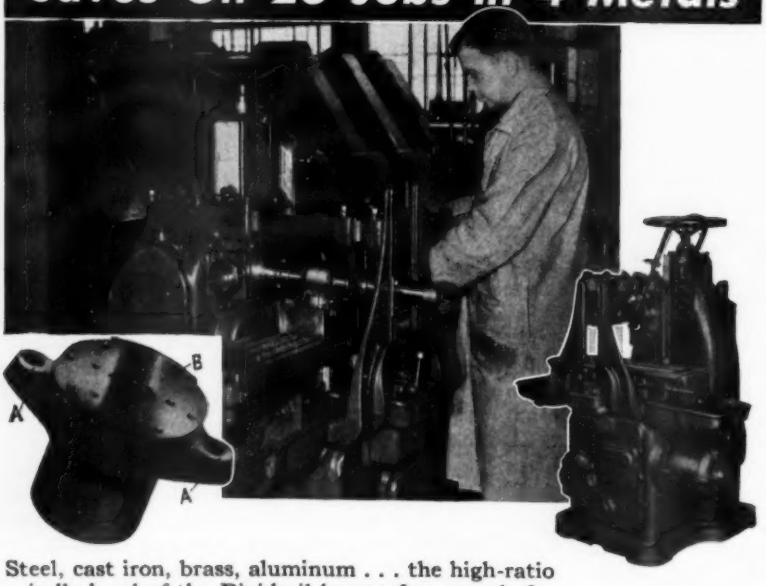
●

Catalog No. 40 has just been released by the Super Tool Company. This catalog deals entirely with Cemented Tungsten Carbides and Carbide Tipped Tools, and contains specifications and data on tipped Reamers, Lathe Centers, etc., many illustrations of special tools, and full specifications on all standard Carbide blanks, bits, and tools.

For a free copy of this catalog address Super Tool Company, Box 68, Harper Station, Detroit, Mich., mentioning THE TOOL ENGINEER.

(Continued on following page)

Sundstrand Rigidmil
Saves On 26 Jobs In 4 Metals



Steel, cast iron, brass, aluminum . . . the high-ratio spindle head of the Rigidmil has surface speeds for cutting all four metals effectively, and for many intermediate combinations. This broad range, and the wide scope of Sundstrand Hydraulic Feed, enables the Rigidmil illustrated to cut costs on 26 different milling operations. One of these jobs is shown above. Surfaces A-A, formerly machined separately, are now straddle-milled while surface B is slab-milled. In addition, automatic cycling between two fixtures saves work-handling time, provides practically continuous milling. Former production is increased 200%. Sundstrand engineers are continually developing similar Rigidmil applications on a wide variety of work. Write for details. Send operation data for specific Engineered Production estimates.

Bulletins shown above contain illustrated descriptions of Rigidmil features and advantages; cycle diagrams and specifications. Use them to check up on milling, find out how Rigidmils can help you. Write for your copies today. Ask for Bulletins 382 and 383.

SUNDSTRAND MACHINE TOOL CO.
2532 Eleventh St., Rockford, Illinois, U. S. A.

RIGIDMILS-STUB LATHES
Tool Grinders - Drilling & Centering Machines
Hydraulic Operating Equipment - Special Machinery

Machine: Convertible open side planer.
Material: Cast Iron (Two castings, 15,270 lbs. each)
Operation: Planing (Interrupted cuts)
Speed: 75 FPM
Feed: .015
Depth of Cut: 3 4"
Tools: REXALLOY Tipped (Two Tools)

*REXALLOY'S extra red hardness .... and toughness permits FASTER CUTTING SPEEDS

Machine: 20-Foot Boring Mill
Material: Semi Steel Castings, 14' long by 4' to 6' wide
Operation: Roughing Cut (Interrupted Cuts)
Speed: 90 SFM
Feed: 3 32"
Depth of Cut: Over 1" (Divided between two tools)
Tools: REXALLOY Tipped (Two Tools)
Time: 14 Hours (Former time was 18 hours with another material)

ON your production you will find REXALLOY tooling almost invariably results in much faster cutting speeds and greater feeds . . . sometimes 100% increase or more . . . because of REXALLOY'S extreme red hardness. REXALLOY is more wear-resisting than High Speed Steel . . . has proven tougher than other cast tool materials in many applications.

More pieces per grind means less down time

REXALLOY tools . . . solid or tipped . . . hold their cutting edge longer at these faster cutting speeds. This resistance to abrasive wear produces much higher accurate production between grinds . . . as important in small lot work as in long production runs . . . always important where close limits are involved.

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LITERATURE TS400 ON REQUEST

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NEW LITERATURE

(Continued from preceding page)

Three New Sheets (6 pp) for *Tools for Jones & Lamson Turret Lathes* are available. They replace pages 2 and 3, 6 and 7, 8 and 9, which should be removed from the catalog and destroyed.

For a free copy of this material address Jones and Lamson Machine Co., Springfield, Vermont, mentioning THE TOOL ENGINEER.

●

Carbide Tool Grinders (16 pp) is the new catalog of the Ex-Cell-O Corporation. Increased production and greater economy in the use of cemented tungsten carbide tipped tools are among the subjects discussed. For the highest efficiency in the use of tools tipped with the "hard metals", according to this catalog, keen, smooth, cutting edges are essential. In addition to descriptions and illustrations of the company's complete line of Carbide Tool Grinders, data on chip curling, grooving, combination wheel set-ups, and rapid grinding technique are also included.

For a free copy of this catalog address Ex-Cell-O Corporation, 1204 Oakman Blvd., Detroit, Mich., mentioning THE TOOL ENGINEER.

Golden Anniversary Bulletin (8 pp) has just been issued by Hardinge Brothers. The bulletin is self-explanatory in the presentation of the modern Hardinge Fully Enclosed Precision Machines. Illustrations on the inside pages have been varnished to produce the appearance of photographs.

For a free copy of this bulletin address Hardinge Brothers, Inc., Elmira, N. Y., mentioning THE TOOL ENGINEER.

●

Jessop Tool Steel Recommendation Chart gives the brands of Jessop tool steels recommended for various tools, dies and other applications. It lists over 150 applications in alphabetical order, with the recommended tool steels indicated at the right of each application. Two different symbols are used to identify the tool

JESSOP TOOL

TOOL STEEL RECOM

APPLICATIONS

IF THE APPLICATION YOU HAVE IN MIND IS NOT LISTED HERE WRITE TO THE MILL FOR RECOMMENDATION OF STEELS TO USE . . .

steels recommended. One indicates recommendations for average runs, the other for long runs.

For a free copy of this chart address Jessop Steel Co., 611 Green Street, Washington, Pa., mentioning THE TOOL ENGINEER.

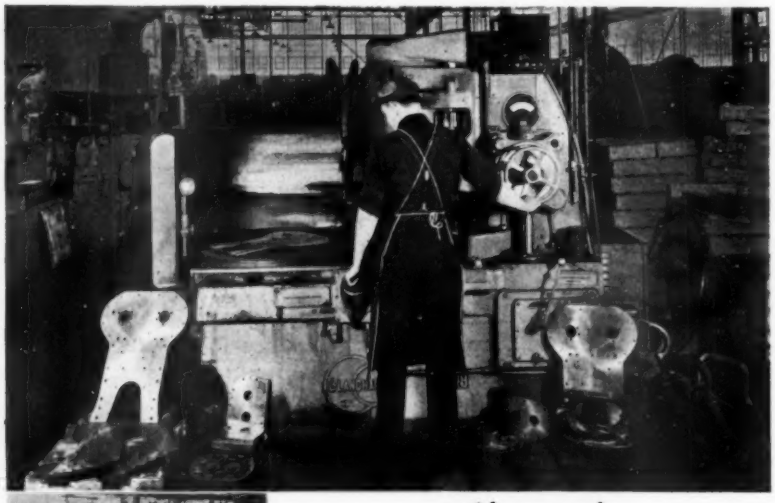
●

Performance Data Sheets Nos. 54 to 57 (8 pp) of the Gisholt Machine Co. include case studies in metal-turning using automatic and turret lathes, and a typical example of static-dynamic balancing on a Dynetric Balancing Machine.

The balancing data covers the procedure followed by a manufacturer of ventilating fans in order to locate, measure and correct unbalance in them. Detailed description of the methods employed for each step is included in the data presented.

The metal-turning installation stories deal with actual machining procedures followed by manufacturers of automobiles, stokers, and portable compressors using Gisholt Turret Lathes and Automatic Lathes. Actual tooling layouts are clearly illustrated for each job. Operation sequences, feeds, speeds and machining times are also given.

For a free copy of this material address Gisholt Machine Company, 1229 East Washington Avenue, Madison, Wisconsin, mentioning THE TOOL ENGINEER.



These No. 18 Blanchard Surface Grinders are earning profits on a wide variety of Diesel Engine parts.

Through

THICK *and* THIN

...THE BLANCHARD NO. 18 IS A CONSISTENT PROFIT MAKER ON FLAT SURFACE WORK.

LARGE work of thin section is usually difficult to grind under the best of conditions. Here the Blanchard method of surface grinding shows to full advantage — the work is held on the magnetic chuck and the wheel takes broad cuts over the surface at each pass. This results in greater accuracy, finer finish, and better production — the Blanchard grinds metal at all times — not air.

Above, a No. 18 Blanchard is grinding 18 x 24" steel engine end plates of thin section. .020" of stock is ground off each side to limits of ± .002" at a production of 7 plates (14 surfaces) per hour. Note also the variety of other parts which are ground on this machine.

In this same plant, another No. 18 Blanchard is used for grinding large, heavy cast iron flywheel housings (see photo at left). 1/8" to 3/16" of stock is ground off one side of the casting to limits of ± .002". Production is 5 housings per hour.

The No. 18 Blanchard can save you money in every department. Let us figure exactly how much these savings will be on your work.

BLANCHARD

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64 STATE STREET, CAMBRIDGE, MASSACHUSETTS, U. S. A.

30,000 stampings ... no redressing

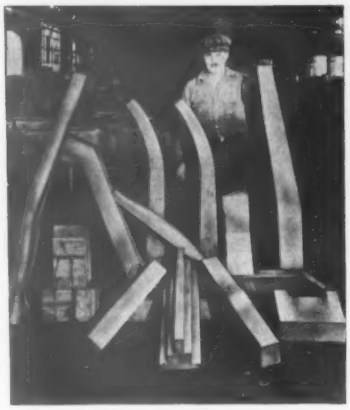
...USING DIES MADE OF

NICKEL

ALLOY IRONS

OVER 30,000 STAMPINGS

without regrinding is the record of dies like these in the plant of a large Canadian automobile plant. Made by the Dominion Wheel and Foundry Co. of Toronto, these dies are specified in Nickel-chromium-iron.



IMPROVED and long service life in forming cold stampings from 0.10" steel is assured in these dies made of "Ryanite," a Nickel alloy cast iron produced by the Allyne-Ryan Foundry Co., Cleveland, Ohio. Strong, hard and wear resistant, also resistant to heat and mild shock, Nickel cast irons are readily machined.

20 TO 1 SUPERIORITY

over plain cast iron in production of washing machine tubs is claimed for these heat treated Nickel-chromium cast iron dies cast by the Youngstown Foundry & Machine Co., Youngstown, Ohio. Fine grained Nickel alloyed irons take a high polish, eliminate galling and streaking of stamped parts.

OVER 2 TONS

in weight is this large alloy iron die cast by Utica Steam Engine Co., Utica, N. Y. Fine grain structure, good machinability, high hardness and wear resistance are assured by use of 2.50% Nickel and 0.80% chromium in the mixture.

• • •

Inquiries regarding die compositions and other tool making applications are invited.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

COMMON SENSE in MANUFACTURING

By
KARL L. BUES
Marchant Calculating Machine Company

IT is a self evident fact that all Tool Engineers are pretty well acquainted with the general process in industry which takes place from the Engineering Department to the Shipping Room door and I suppose that you have had a generous share of the headaches and grief which seem to be ever attendant. Yet it might be well to review some of the principles involved in the orderly process of manufacture, starting with engineering, tooling, production, and inspection, without going into the necessary elaborations and ramifications associated with them.

The most important thing which concerns these main divisions as a whole in order that they may function most efficiently is a distinct and definite understanding of where one stops and the other begins and, after these responsibilities have once been established, that a profound respect for them should prevail; next is an understanding of what can be reasonably expected from these divisions within the latitude of economic operation.

Just as most of the free things in life are least appreciated some of them are least used and Common Sense is such a one, but perhaps it should be called uncommon sense.

I have particularly noticed in recent years that when trying to decide a course to pursue or a manner of doing, that we anticipate and find so many things that can go wrong, cross so many bridges before we get to them, build up within ourselves such a barrier of doubt and fear that we are left standing without an answer to our problems, whereas in the time that we are struggling and groping for an answer we could have tried what seems to be a feasible method.

Value of Practical Approach

It is my own personal opinion that while theory is a fundamental essential to fundamental problems that it has on occasion clogged the avenues of practical sense and should therefore be abandoned just as soon as it has served its purpose.

Considering engineering which is really the starting point in industry, let us ask ourselves just how much can manufacture expect from engineering. It would seem that orderly and efficient engineering should be primarily responsible for the conception and development of ideas and that ideas worthy of development should be developed in as practical a manner as possible. It is all too often the case that ideas which work perfectly on paper do not work in metal and some that will work in metal are too costly to manufacture economically, thus no division in industry is in a better position to keep manufacturing costs down to a minimum than engineering.

By this I mean that unless engineering has made its design as simple and tolerant as possible this failure is bound to

While theory is a fundamental essential to fundamental problems there are times when it clogs the practical road.

reflect itself in expensive tools, methods. and inspections. I am not at all unmindful of the fact that time is a very important consideration in engineering work and that engineering maintains no stock room to which it can go and requisition a certain idea for a certain job. Neither am I unmindful that because of lack of time, due sometimes to unjustified pressure, it is unable to give a design sufficient consideration.

This is not common sense either.

Simple Designs Best

I shall never forget when I had my first job as Supervisor of a model-making and experimental division which in this particular instance was closely associated with manufacture. One of the new designers had developed a piece which from a manufacturing standpoint was simply impractical to make although quite possible to make by hand with enough time. When we asked him how he expected us to make it, he said without any visible disturbance whatever that that was for us to worry about.

That actually happened and I am very glad to know that such types of men are very scarce, yet it can be called an exaggerated illustration of how engineering can affect manufacturing costs.

I also recognize the fact that a broad latitude of tolerance is sometimes physically impossible and must of necessity be, but the fact still remains that complexity in design is a strong promoter of close tolerances. Believe it or not, I have seen holes specified plus or minus one thousandth, which were used to hook a spring into. This close tolerance appertained not only to the hole itself but to its physical location as well. You may easily imagine the increased and unnecessary cost.

A thought that I should like to leave with you is that common *sense* spent in engineering saves common *cents* in manufacture.

This brings us into tooling and while the thought of engineering's effect on manufacturing is still fresh in our minds it might be well to say at this time that if tooling does not exercise a sensible attitude towards tools it can cancel all the common sense that engineering can ever hope to possess.

Manufacture has a right to expect from tooling a class of tools which will not saddle manufacture with an unbearable overhead burden. Here again common sense plays an important part. Let us suppose for an instant that a new design from engineering is thrown into the tooling division for tooling. The design is more or less complex and, because of that, it is left open for probable changes. Because it is something new some reasonable question still exists as to its future production quantities. Under these conditions it would seem foolhardy to go headlong into expensive permanent tools, so that temporary tools should be given serious consideration.

If temporary tools for this job cost $25,000 and permanent tools cost $100,000 and allowing $5,000 additional production cost for using temporary tools for a given number of parts which would be necessary to prove the design and quantities, it would be far less expensive to throw away the $25,000 worth of temporary tools than it would be to replace $50,000 worth of permanent tools.

By the same token it would be more expensive to continue the use of a temporary tool where the quantity of production and sometimes the nature of the part warrants a permanent tool.

In connection with production there are one or two points having to do with sensible procedure that should be considered. Many times I have seen people struggling with first class tools and in the struggle tools were trotted back and forth to the tool room for adjustments, changes, and repairs until finally, after an expenditure of much time and money, the tool produced satisfactory parts. I am not thinking of tools which in their initial setup required some minor changes to compensate for unexpected conditions, but of tools which have already over a period of time proven their design.

Failure of Accurate Die

To illustrate this point there is an incident which happened in our plant only a few weeks ago. We have a battery of small presses which are maintained in good condition. We had occasion to put into one of these presses a die set which had to pierce a hole in a very sensitive assembly and this hole had to be held extremely close. The die set is made about as accurately as possible, mounted on pillars, and the punch operates in a guided stripper plate, yet the parts were not the same as the previous run.

We fooled around for awhile with this job and did not even get to first base and just about the time that the die was going to be pulled and sent into the tool room Old Man Common Sense came along and suggested that we put the die in the same press that made the previous run.

We did that and our trouble disappeared.

At first this may sound somewhat silly to you Tool Engineers but you know from experience that different presses do produce different results on certain sensitive jobs. We also knew it, but we failed for a time to use our common sense.

Another point which deserves some very careful consideration is the relation of savings in production operation to the cost necessary to make them. If it costs fifty dollars in the tool room to save ten dollars in the press room even though it shows up as a ten dollar saving on the books, have we really saved the company any money?

We do know that substantial savings have been made in our plant through improvements in tools recommended by the production division and that likewise a tremendous reduction in accidents has been made. Yet we should not let our common sense be overcome by a zeal to make what may prove to be an expense and not a saving.

We can paint a glorified picture of our own accomplishments but if they cannot be reduced to actual savings for the company the paint will eventually be washed away by the balance in the bank.

Inspection a Vital Process

A task where common sense and good judgment play a most important part, and to my way of thinking are about the only assets it has, is inspection. An inspection division is primarily set up for the mutual protection of the manufacturer and the customer and just how difficult this task of protection becomes depends entirely on how well engineering, tools, and production have done their jobs.

The responsibility of inspection is not so much rejecting defective parts as it is preventing them. If inspection is carried on in an arbitrary manner it will retard production and increase the cost of manufacture and if it is carried on in a loose manner it is worse than useless as it will not prevent sending out an unsatisfactory product.

But if properly applied the principles of inspection will encourage the economical production of parts with an assurance that all requirements are reasonably met.

The tendency of production is to neglect all thoughts of the final use of parts in process, concentrating chiefly on its efforts to increase production, the standard of quality being anything that inspection will accept. An unfortunate situation almost inevitably arises in which the production department is absorbed in the details of their problem and seeks the lines of least resistance, while the inspection department either connives or arbitrarily insists on the exactness of drawings without sufficient regard for the use of the part in question.

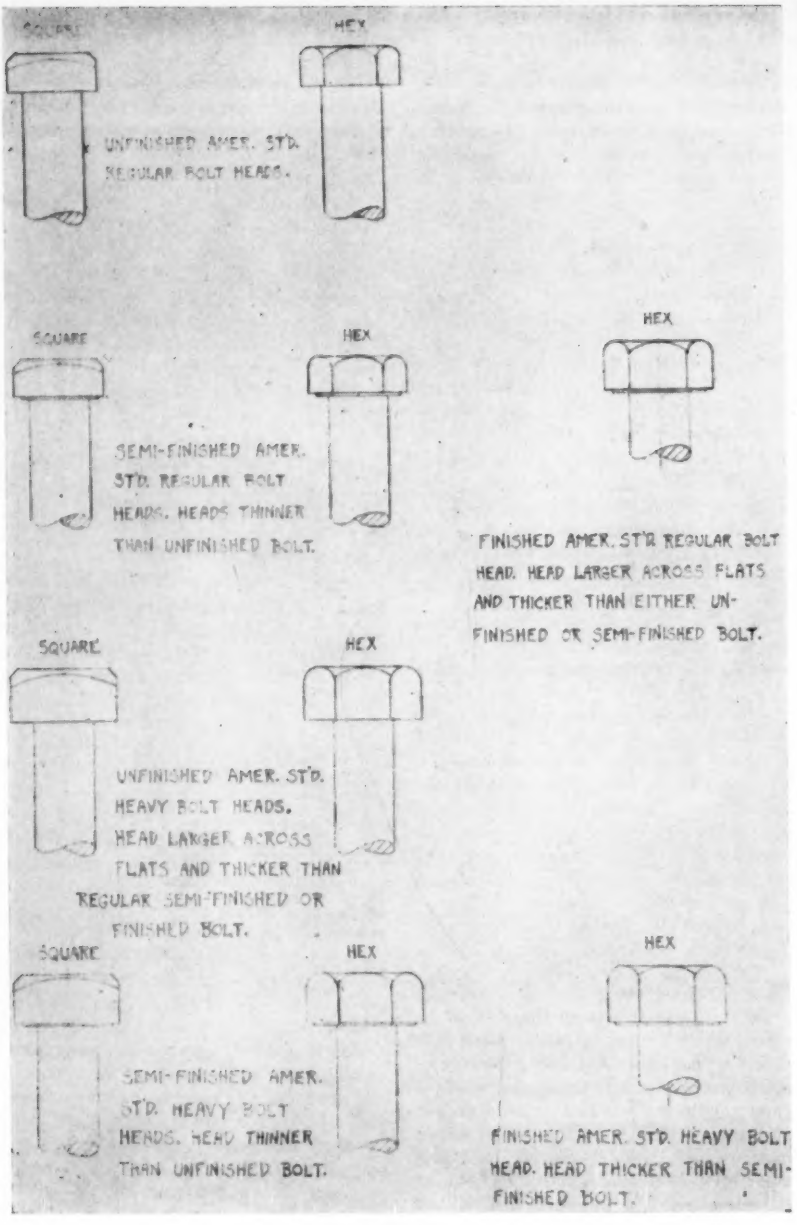
If inspection is to accomplish its purpose discretion must be used.

In conclusion I should like to say that a liberal understanding and a tolerant attitude towards the problems of the other fellow will allow our minds to think clearly and sensibly. Common sense, in my opinion, is the power of reason coordinated with the faculty of understanding.

Cold Fo
Fab

By
R. E. CHRISTIN
Metallurgist
Columbus Bolt Works

R. J. FRETER
Chief Engineer
Columbus Bolt Works


SQUARE
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UNFINISHED AMER. ST'D. REGULAR BOLT HEADS.
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SEMI-FINISHED AMER. ST'D. REGULAR BOLT HEADS. HEADS THINNER THAN UNFINISHED BOLT.
HEX
FINISHED AMER. ST'D REGULAR BOLT HEAD. HEAD LARGER ACROSS FLATS AND THICKER THAN EITHER UNFINISHED OR SEMI-FINISHED BOLT.
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FINISHED AMER. ST'D. HEAVY BOLT HEAD. HEAD THICKER THAN SEMI-FINISHED BOLT.

Plate A

BOLTS, long ago, were defined as "rods of iron with a knob on the end." This was because they were made to rather crude specifications by a blacksmith and usually of Norwegian Iron, which was available at that time. The threads were turned roughly to fit a nut or the nut was made to fit the particular bolt.

How different bolt making is today!

Today, the raw material (referred to as "rod") is pickled and cold-drawn to close tolerances of .002" after which it is called "wire". Bolts are either upset (cold or hot) or milled from a bar. When a bolt is upset or headed, the raw material is the size of the shank, (i.e., ¼", ½"), and the head is upset to the dimensions desired. In cold heading, it is customary to upset a round head and trim a hexagon or square shaped head for a machine bolt. When a bolt is milled from the bar, the size of the raw material is the size of the head and the metal is turned off to the shank size and the turnings are scrapped.

The analysis of the bolt depends on the customer's specifications, if provided. Standard bolts, usually made to stock orders, follow specifications set up by the American Institute of Bolt, Nut and Rivet Manufacturers, which have the approval of the National Bureau of Standards. Bolts, like nuts, are classified as Standard and Special, depending, in most part, on the type of head, which determines the name of the bolt.

A—Standard bolts are divided into
(1) unfinished or commercial bolt,
(2) finished bolt or cap screw.
1—(a) machine bolts, square and hexagon.
(b) carriage bolt, with or without square under head.
(c) step bolt, black or turned.
(d) plow bolts of several types known by numbers 1 to 8.
(e) lag screw, machine bolt head (square) with special threads.
(f) stove bolts.
2—(a) cap screws, hexagon head heavier than machine bolts and finished.

B—Special bolts are those not included in the list of Standards, and include such types as bumper bolts, wheel or rim bolts or such types as require special heads or special applications where the standard bolt will not be adequate in hardness or strength. In such cases the specifications should include information as to hardness or other properties necessary.

Upset or headed bolts are generally made from a low carbon steel (S.A.E. 1010 or 1020) because it serves the general purpose required for stock bolts, and lends itself to cold-deformation with the least amount of trouble with dies, thereby keeping down costs of manufacture.

Milled-from-the-bar bolts, because of the great amount of machining necessary,

orge
abrication

A far cry from the old rod of iron with a nob on the end is today's bolt. Here is how this simple yet vital object is forged.

are made from steel which can be machined readily; i. e., high sulphur steel, known as screw stock or S. A. E. 1112.

Because of this difference in steel analysis, a standard stock bolt will have greater strength when milled from the S.A.E. 1112 bar than when cold-upset from low carbon steel. By the same token, it must be kept in mind that when greater strength is desired, the cold-upset bolt must be made from a steel which will give the required strength.

S. A. E. 1010 steel is more ductile than 1112 steel, a factor which is of considerable advantage in cold heading. The 1112 steel on the other hand, because of the high sulphur (about 0.10%), is more brittle, which makes it more favorable when machining. The elements, then, which produce high ductility make desirable heading properties, and the elements which produce low ductility make desired machinability.

The method of manufacture does not determine altogether the physical properties of the finished product.

Whether cold or hot-headed or milled-from-the-bar, the strength of the bolt is dependent on the analysis. The same properties can be obtained from a cold-headed bolt as those obtained from a milled-from-the-bar bolt. For example, a milled bolt of 1112 steel will give a tensile strength of 80,000 pounds per square inch (PSI), which will require at least 1020 steel in a cold headed product, since 1112 steel will not upset conveniently without the tendency to crack axially.

Most cold headed bolts are annealed to 1200 degrees to relieve heading strains. There are exceptions when the upsetting in a thick head (¼" or ⅜" machine bolts for instance) does not require annealing, because the location of the strained area is near the top of the head rather than close to the shank where failure occurs if the area surrounding the strained section is not sufficient to resist shock such as a hammer blow.

Tensile strength, which is the amount required to cause failure, is measured in pounds per square inch and may vary from 60,000 in 1010 steel to over 200,000 in heat treated bolts. Most steels can be cold-headed, though some will present difficulty and increase the die costs considerably because of their low ductility (as measured by the high elastic limit and low reduction of area).

Preliminary treatment of the rod, from which the wire is cold-drawn to size before heading, is sometimes essential in order to render the steel in a condition suitable for heading. These operations include process annealing, normalizing, spheroidizing, etc. The results are lower hardness and a change in grain size. Steels for heading include carbon, high manganese, chromium, nickel, vanadium and stainless grades. Copper alloys and aluminum are also cold-headed.

The least a bolt should withstand (and this means standard and special bolts) is the pull of a wrench which measures in length 16 times the diameter of the bolt. In other words, a ½" bolt should not stretch when assembled with an 8" wrench moved by hand of an average man.

Bolt failures should be thoroughly investigated to determine the cause, whether premature or natural, and whether due to repeated stresses, known as fatigue and often misnamed a "crystallized" structure. A bolt never fails because it has crystallized", meaning grain growth, (which can occur only at high temperature). The grain is the same after failure as it was before and can be proven

(Continued on following page)

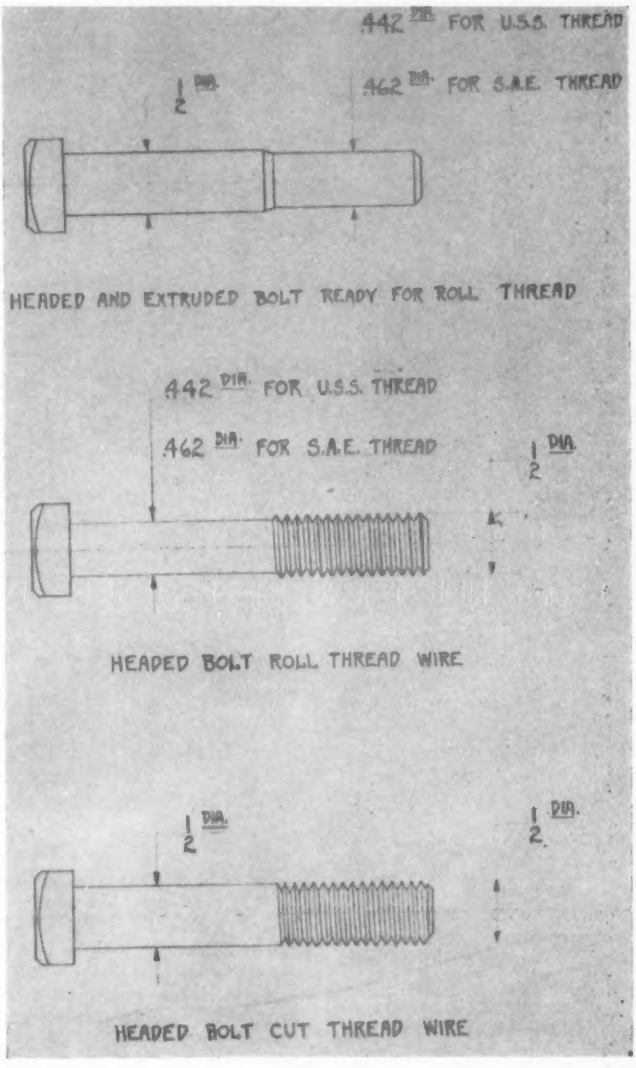


Plate B

COLD FORGE FABRICATION

(Continued from preceding page)

by examining any portion under the microscope and comparing with the section that failed. Failure can occur from a bolt being too soft for the application, or too hard, or being overloaded, from concentration of stresses, in a sharp corner or threaded section, or even from defective steel or improper heat treatment.

There is a false belief that cold-headed bolts "lose their heads", but reputable manufacturers who stand behind the quality of their product have eliminated such defects.

The long, rapid strides with which cold-heading technique has progressed during the past few years have opened vast, new fields for the cold-forged process. A few fundamental principles still stand and must be observed, but the method, though as yet basically unchanged, has been modified and refined until a remarkable degree of versatility has been attained.

With the control of furnace temperature now available for instance, such tendencies as "head lifting" are completely removed in the plant.

Not so many years back, cold-heading was limited to the manufacture of rivets, bolts and simple screws of a low carbon content, with steels of from 7 to 10 points carbon as the highest grade materials worked. With the advent of improved machine and die designs along with alloy tool steels, we have for some time been able to produce cold-headed parts of extremely high tensile strength, forging high carbon and alloy steels with accuracy, rapidity and economy. The field of cold-heading has so expanded that today cold-forged parts are an integral factor in almost every mechanical and structural assembly. The scope of products encompassed by this method of manufacture includes thousands of varied shapes and designs which were formerly and still are in many cases, made by slow, expensive methods.

The ever-increasing trend is toward high-carbon and alloy steel bolts, screws and other threaded parts. This affords greater strength from smaller sections, enabling builders and designers to reduce sizes with a resultant saving in weight, space and materials without sacrificing any other requirement.

The working of high-carbon and alloy steels, of course, presents manufacturing problems. Die and tool life is considerably shortened, and for this reason, a method of decreasing die costs is necessary. This has been accomplished quite satisfactorily by the use of composite die assemblies. The correct composite die design readily adapts itself to "pre-loading", a feature which tends to greatly prolong die life by preventing fracture. This type of die consists of two or more component parts—a retainer and suitable inserts.

A simple composite die is illustrated here. The outside diameter of the insert "B" and the well in the retainer "A" are ground on a matched taper. If the insert is ground enough larger than the well to produce the required amount of "press" when the insert bottoms in the well, "pre-loading" is assured. Although this die

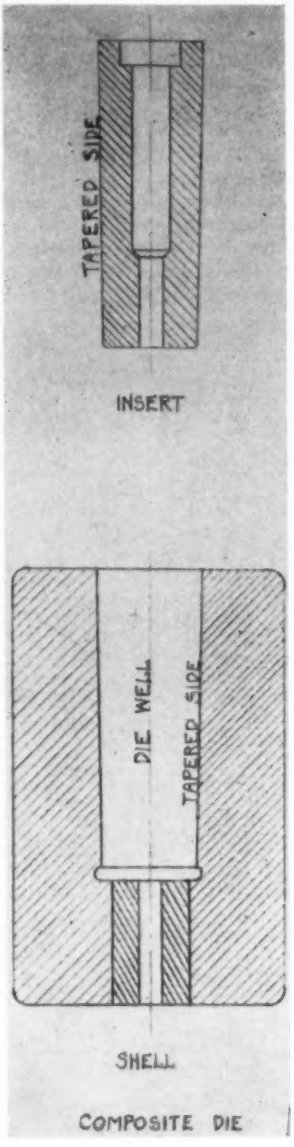


Plate C

assembly requires accurate workmanship, it can be produced economically by development of proper machine shop practice, and its ultimate cost is far less than that of solid or other types. Its very satisfactory performance more than compensates for the inconvenience of its manufacture.

PLATE B

In order to produce cold-forged parts more cheaply and rapidly, several operations are frequently combined so as to be performed simultaneously. Combined heading and extruding and pointing can be accomplished in one operation. Bending and heading, flattening and heading and many other combinations can be achieved to produce a better part at lower cost. Operations which cannot be simultaneously completed in the header can be combined readily in the functions to follow, such as trimming and extruding, extruding and pointing. It is very common to produce a semi-finished cap screw in three operations.

The method of cold-forging and cold-working of metal results in a product superior to that from most other methods of fabrication. Correct cold-working, held within the proper limits, increases the physical properties of a bolt to a marked degree. The continuous flow of the metal, if properly handled, is maintained just as it existed in the cold-drawn stock.

In roll threaded sections for example, the physical properties are improved first by the extrusion process and again by rolling the thread.

The threads on the cold-headed bolt, of course, can be either cut or rolled. When threads are to be cut, full size stock is used. For rolled threading, the stock is reduced by drawing or extrusion to the pitch diameter of the thread, so that when rolled, the outside diameter is the same as the cut thread.

PLATE C

The shank between the threaded section and the square or the head may be full size or 1/32" undersize on rolled threaded bolts, if the thread is not up to the head or square.

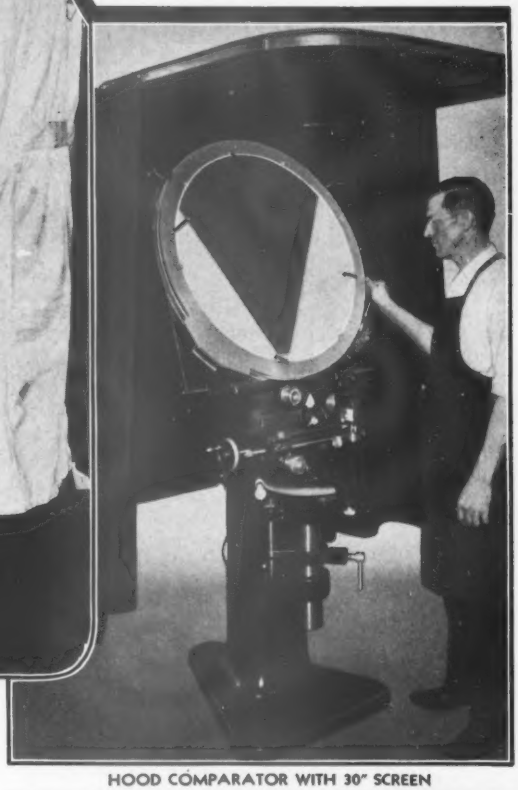
When the thread is rolled, the bolt is about 13% stronger than the bolt with the cut thread, due to the cold-working of the metal in rolling and the fact that the flow lines in the steel are continuous and have not been cut. If subsequently heated for annealing or heat treating, this cold-working property is not retained in the same proportion, but impact tests demonstrate that the rolled thread has higher values than the cut thread even after heat treated to the same hardness. The superiority of cold-worked products therefore, is obvious.

Sharp corners, of course, should be avoided. Also, sharp squares cause premature die failure, thereby increasing the die costs and the ultimate total costs. These corners are a source of trouble and should be replaced with as many radii as possible. Stresses are like an army and will rush to a sharp corner to cause destruction, whereas a radius will distribute that army of stresses and relieve the situation. Likewise, threads should never be located where there is a bending movement, but should be placed outside of the range of any flexing motion as the minor diameter of the thread is an easy starting

(Continued on following page)

INSPECTING STEERING GEAR WORM

Why have arguments when you can see the facts?



HOOD COMPARATOR WITH 30" SCREEN

There may be cause for discussion, but there is no room for argument

OPERATOR and Inspector, Foreman and Superintendent can *all* see the same thing at the same time with Jones & Lamson Comparators. Several observers can *inspect and measure* pieces to within .0001" and agree unanimously. The most intricate parts are inspected quickly and accurately by even unskilled labor.

In many instances, the Product itself can be improved by easier and more accurate gaging. You should explore the profit possibilities of these machines, that may save you hours of inspection time, reduce your scrap, and improve your product.

Jones & Lamson Comparators cover the whole field of Projection Inspection from profiles barely visible to the naked eye to larger parts held to extremely close limits and difficult or impossible to gage mechanically.

BENCH COMPARATORS

JONES & LAMSON MACHINE COMPANY
Springfield, Vermont, U.S.A.

Manufacturers of:
Saddle & Ram Type Universal Turret Lathes . . . Fay Automatic Lathes . . . Automatic Double-End Milling & Centering Machines . . . Automatic Thread Grinding Machines . . . Comparators . . . Tangent and Radial, Stationary and Revolving Dies and Chasers

PROFIT PRODUCING MACHINE TOOLS

COLD FORGE FABRICATION

(Continued from preceding page)

place for fracture when placed under the strain of a bend.

The production rates achieved by the cold-heading process can be equaled by no other method. Due to systematic standardization methods wherever possible, the time required by cold-forging engineers to get into production on new projects is shorter than that necessary for any other type of manufacture.

Cold-forged fastenings such as rivets, screws and bolts, can frequently be employed with complete success, while other methods often fail due to difference in materials, methods of assembly and use of non-ferrous substances.

Bolts and nuts are utilized as fasteners in small or large assemblies and therefore are flexible. They allow for removal for repairs to assemblies and also can be adjusted in case of changes, where solid or welded assemblies do not permit such flexibility. A saving is very often effected by the prevention of failure of some expensive assembly by having bolts which will yield before the others parts in the assembly.

Cold-forging engineers can be of invaluable assistance in designing cheap, efficient parts which will solve costly problems in fabrication.

A large variety of new articles can be made by cold-forging and the field affords limitless possibilities. The industry is rapidly coming to the fore, and the near future is certain to bring innovations heretofore unimagined.

A new Bessemer screw steel and a new open hearth screw steel have been announced by the Union Drawn Steel Division of Republic Steel Corporation. Developed to overcome deficiencies in fast machining steels formerly available, it is claimed that bar after bar of these new steels can be machined at highest speeds with a resulting fine surface finish and without reduction in tool life.

Produced through the combination of modern chemistry and an advanced process of manufacture, these steels are remarkably sound and dense in structure, free from defects which cause internal seams and difficulties that lead to rejection of finished parts and which shorten tool life and disrupt continuity of high speed machining operations.

The new Bessemer steel, Union Maxcut, has physical properties comparable to S.A.E.X 1112 and the open hearth steel, Union Multicut, has physical properties similar to S.A.E. 1115. Both steels have been tested on the automatic screw machine in Union Drawn's experimental laboratory and in actual production runs in the plants of a number of screw machine parts producers.

Whiting Williams, Noted Writer, to Address Meeting

Detroit, August 28—Whiting Williams, Industrial Consultant, Writer and Lecturer, will address the Semi-Annual Meeting and Dinner of the American Society of Tool Engineers it was learned late today. The meeting will be held at the Roof Garden of the Hotel Gibson in downtown Cincinnati on the evening of October 18, 1940, and will be part of the three day session of the society held in Cincinnati on October 17, 18, 19. Mr. Williams will address the meeting upon the subject, "What we can Learn from Europe."

Featured at the technical sessions will be two symposia upon the subjects "Should Industry Assume the Burden of Special Education," and "Gear Finishing."

Among the speakers at these symposia will be F. E. Searle, Head of the Ford Trade School, who will speak on "The Importance of Engineering Preparedness." Dr. R. C. Gowdy, Dean, College of Engineering and Commerce, University of Cincinnati, will speak of "Cooperative Education." W. S. Dowman, Assistant Director, Sales and Office Personnel, Goodyear Tire and Ruhber Company, will speak on "Industry's Post Graduate Course." George Schiele, Chief Inspector and Member of the Board, Cincinnati Milling Machine Company, will discuss the papers.

The subject of gear finishing will be introduced by Marvin R. Anderson, Vice President, Michigan Tool Company, who will speak on "Shaving and Lapping Gears." Following him Otto H. Schafer, President, Schafer Gear Works, will speak on "Production of Gears by Shaving and Lapping Methods." I. J. Gruenberg, Chief Engineer, Gear Grinding Machine Company, will discuss "Grinding Process of Finishing Gears." Charles Pfeffer, in Charge of Gear Development and Production, Wright Aeronautical Corporation, will conclude with "Production of Gears by Grinding Process."

The meeting will open with registration in the Mezzanine of the Hotel Gibson on the morning of October 17. The meeting will continue through Thursday and Friday with plant tours throughout the day and meetings in the evening. It will conclude with a meeting on Saturday morning.

A choice of seven different plant tours will be provided to the leading plants in the Cincinnati area. These will each cover two or three plants. Transportation will be furnished.

A floor show will conclude the banquet meeting.

New Classification of Tool Steels

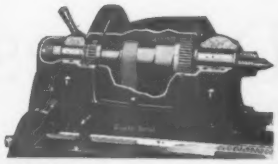
New York, August 20—The American Standards Association today announced that it has been requested by the *American Society of Tool Engineers* to undertake a new project on the classification of tool steels by classes of usage. The purpose of this will be to eliminate the guesswork in selecting the proper steel for various uses, thus prolonging tool life, wearing qualities, etc. This project does not concern tool steels alone but also other materials used for cutting tools, such as cemented carbides and Stellite.

According to the A.S.T.E. there are about 1,000 brands of tool steel on the market today, of which many are identical or nearly so. Since there are no standards by which the qualities of these multitudinous brands can be judged and classified, the user is bound gradually to drift into a general use of a certain few varieties of tool steel from which he has happened to obtain generally satisfactory results. Many times, therefore, he may be using the wrong steel for particular applications.

This new project for Standardization of Materials for Cutting Tools proposes to index all tool steels by class designation, by manufacturer, by trade name, and by classes of usage. The American Society of Tool Engineers feels that this classification of tool steel by types, or uses, rather than by trade name alone will make the choice of the steel for a particular application a simple matter to the user.

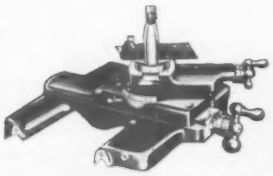
The request for the new project is being submitted to the Standards Council of the American Standards Association for action at its September meeting. It is felt that a centralized effort to correlate all previous activities along these lines and produce an American Standard will be beneficial to all.

Precision is Assured IN A SOUTH BEND LATH

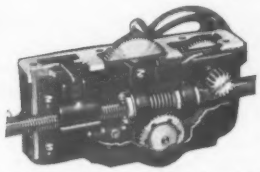


HEADSTOCK. Cutaway view showing integral type bearing and the capillary oiling system.

SUPERFINISHED SPINDLE is made of alloy steel with bearing surfaces carburized, hardened, ground and superfinished.



IMPROVED SADDLE and compound rest with adjustable tapered gibs. Cross slide bridge is wide and deep, providing rigid support for the tool rest.



DOUBLE WALL APRON is rigid box type construction with all steel gears running in oil bath.

UNDERNEATH MOTOR DRIVE. Belt drive to spindle is smooth and powerful and provides a wide range of spindle speeds.

PRECISION is assured in South Bend Lathes by combining fine workmanship with sound machine design. Expert mechanics, skilled by years of experience, fit and test each unit with a degree of exactness known only to the machine tool builder.

South Bend Lathes are used in the tool and gauge departments of nationally known manufacturers for the most exacting classes of precision work. They are also used for production operations on interchangeable parts requiring a high degree of accuracy. Conveniently located controls assure an ease of operation which reduces operator fatigue, resulting in a uniformly efficient rate of production over a long period of time.

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TRADE MARK SOUTH BEND TWIN ENGINE LATHES

New Adaptations of

Electron Discharge Devices

By
RALPH A. POWERS
Electronic Control Corporation
DETROIT

That interesting device—the Electric Eye—is becoming a valuable time saving implement for the Tool Engineer. Here's how.

IN attempting to describe some of the more recent applications of electron tubes, many individual jobs will, by necessity, be eliminated. Only a few that are most recent and that fit in with the Tool Engineer's program, will be described.

Three Types

There are three distinct classifications of "Electric Eyes", or photoelectric cells. The earliest group was the photo-conductive and, as might be expected from the name, the electric conductivity of this cell varied according to the amount of light allowed to impinge upon its sensitive area. Selenium crystals were most generally used in making this type of cell.

The second classification of photoelectric cells is the photo-voltaic. This group of photoelectric cells generate their own voltage and current when light is applied to the light sensitive area. The amount of current and voltage coming from the cell is of an unusually low order and as a cell has very low internal resistance and cannot be readily amplified by a conventional vacuum tube such as you use in your radio. As a result, this general group of cells has been relegated to use in exposure meters, illumination meters, and other devices where only meter indication of the light is necessary.

The third group is the photo-emissive classification. A few of the general types of photo-emissive cells, such as used in various industrial applications, are illustrated. These cells have the best characteristics of any at the present time. They will respond to light "on" and light "off" or light modulations up to 12,000 to 15,000 cycles per second. They have their maximum response in the infra-red and near infra-red portion of the spectrum making them especially suited for industrial control applications with an incandescent lamp, as approximately 84% of the total radiation from an incandescent lamp is in the invisible or near infra-red. The other 16% of the radiation is that which we can use with our eyes for reading, etc. Of course, the emissive type of cell has a very low output and accordingly must be amplified by ordinary tube methods in order to obtain satisfactory results.

Today we have tubes and more tubes—400 or 500 different classifications of amplifying tubes from which to select suitable tubes for operations with the photo-emissive cell. The radio has been responsible for the wide development and acceptance of thermionic or amplifying tubes and as various set designers for automotive radios, to A.C.-D.C. sets for your houses, have changed their ideas, the tube engineers have kept in step and have offered new groups of tubes almost monthly..

By using radio amplifying tubes the output of an ordinary photoelectric cell of the photo-emissive type can be made to operate substantially well built, long lived telephone type relays. The telephone type relay is long lived when one considers how many times it operates during several years that you have uninterrupted telephone service in your home.

If it is desirable to operate large contactors or relays from the photo tube, other stages of amplification may be added, the same as they are in your radio,

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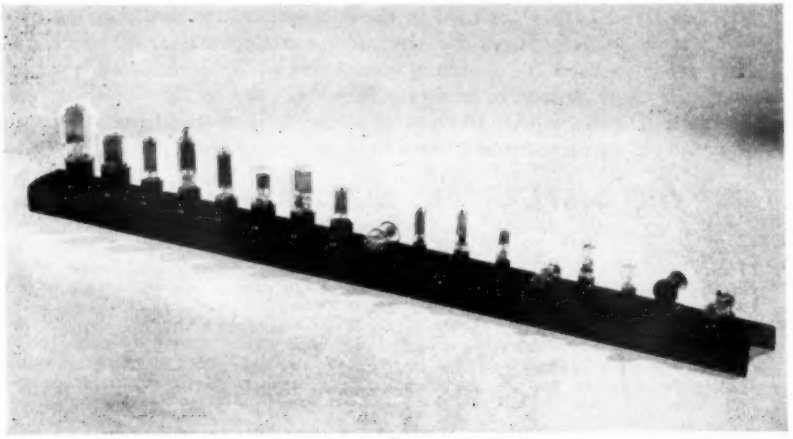

Electron tubes, photo-electric cells or "Electric Eyes" are "tools" for the Tool Engineer to consider. Here are a few of the photo-emissive type which are finding wider use in industrial applications.

A PROGRAM - To Help You Get More Output from Machines and Presses

That's today's problem—to *do* more with the equipment you already have.

And it can be done. Right now machines and presses in most plants are shut down a far higher percentage of time than need be. The cause is tools—tools that were efficient by earlier standards, but fall behind modern demands for performance. Each time such a tool wears out, chips, goes out of tolerance, breaks, or fails—a machine or press in your plant is stopped—for 10 minutes, an hour, a morning or several days.

That's a solid chunk of extra plant capacity well worth going after. And here is a way to do it that is proven by application in more than a thousand plants.

It is simply the use of Carpenter Matched Tool Steels *selected and heat treated by Carpenter's Matched Set Method.* Here is a system —born in the tool room—that you can put to work immediately to give your plant more capacity—no waiting for additions to plant, new equipment, or additional trained men. You can start where you are to make a general improvement in the performance of your tools, and gain extra output and lower unit costs.

In this new Carpenter booklet on Spotlighting Hidden Plant Capacity, you will find a ready-to-use program for accomplishing this outline. Get your free copy today. Just mail this coupon.

Send TODAY FOR YOUR COPY OF THIS NEW CARPENTER BOOKLET!

TELLS where to look for extra output and *lower* unit costs.
STATES why the average tool can be made *twice* as good.
GIVES case records of tools *before* and *after.*
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ELECTRONIC DEVICES

(Continued from preceding page)

until sufficient power output is derived to operate a solenoid valve, a large contactor, a motor regulating device, an automatic rejection device or similar equipment placed directly in the plant or anode circuit of the final tube of the amplification chain.

The items deal specifically with photo tube operation; but there are countless other applications where straight, forward amplification has been found essential in order to obtain accuracy and speed.

It is a known fact that with a conventional amplifying tube a few micro-amperes (millionths of an ampere) of current going through contacts of a gauge head will in turn cause the grid of a conventional amplifying tube to become sufficiently positive so that the plate circuit can control several milli-amperes and with two are three stages of amplification even the primary of large welding transformers, 50 KVA or more, are being excited in the anode circuit of electron discharge devices.

In other words, today the association of various electron discharge devices opens an entirely new field to the Tool Engineer. Among other things, it allows him to measure more accurately with greater speed and greater economy than has heretofore been possible. Some applications result in automatic machines.

It is best to start out with the simplest of photoelectric applications. By simple applications we usually refer to the straight, forward light on and light off applications. As a typical example, the standard Light Relay and Light Source will either open or close a circuit upon interception or upon re-establishment of the beam of light between the Light Source and the Light Relay unit. This is indicated by the two pilot lamps. Upon interception of the beam of light, one pilot lamp is extinguished and another pilot lamp becomes illuminated. These standard Light Relays, consisting essentially of a Light Source projecting a beam of light through an optical system to a photoelectric cell, followed by a single stage of amplification and a single magnetic switch which will either make or break a circuit upon cutting the light off or allowing the light to impinge upon the photoelectric cell, are being used for control of conveyors, starting and stopping motors, safety devices on elevator doors, routing tote pans on conveyors, opening and closing doors, and other similar applications where it is desirable to have a frictionless contact with an object. We will refer to the interception or establishment of a beam of light as being frictionless, although in theoretical practice there is some energy dissipated by moving the object into the beam of light and also energy expanded by the beam of light in the course of removing the object.

These general "on" and "off" applications where the beam of light is two to three inches in diameter do not usually fall within the category of applications of the Tool Engineer. However, more advanced photoelectric equipment has been used by the Tool Engineer to advantage.

The multi-stage photoelectric amplifier with self-contained power supply for furnishing direct current to the various components of the circuit offers a great deal more sensitivity as far as light "on" and light "off" the photoelectric cell is concerned; can be used as a limit switch, as a gauging unit, as a temperature controller with resistance heater, and countless other applications now in the automotive and allied industries.

This particular unit will operate with a Light Source (see sketch) having an optical system consisting of two culminating lenses which in turn project an image of the filament of the lamp on the optical slit. A corrected objective lens picks up the image of this brightly illuminated optical slit and refocuses it at approximately 5/8" from the objective lens. At this point the slit can be varied from 0.0005" in thickness to several thousandths of an inch in thickness, depending upon the application. As the photoelectric amplifier

(Continued on following page)

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Products that are original and different plus modern sales engineering total a service worthy of investigation by every economy-minded plant executive.
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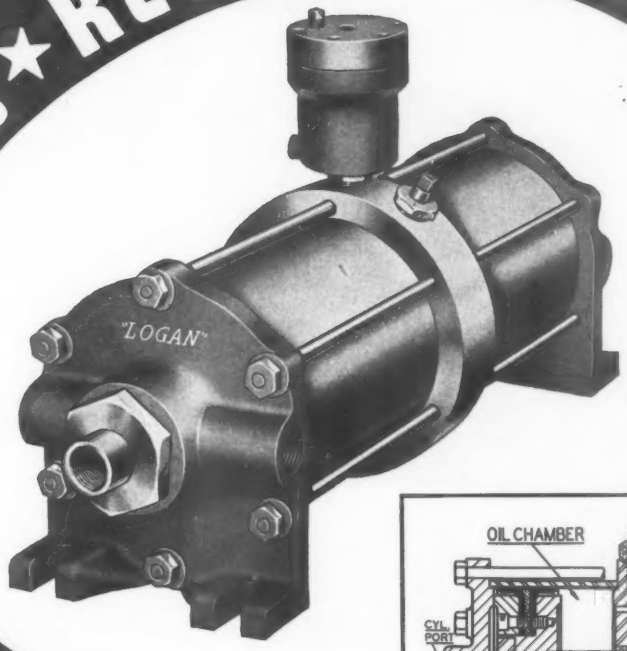

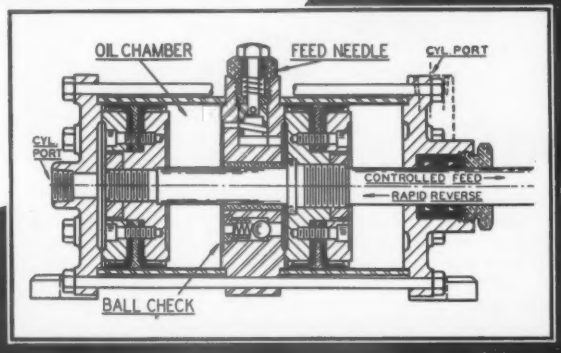

OPERATED BY AIR - YET ALL HYDRAULIC FEATURES RETAINED

Industry has long needed a cylinder that combines the speed of an air cylinder with the smooth, steady cushioning action of a hydraulic cylinder. "LOGAN" Air-Draulic Cylinders retain all of the best features of both. They are adaptable wherever air pressure is available as a power means. The hydraulic regulating action is self-contained, providing a smooth flowing feed stroke, either continuous or adjustable. These new "LOGAN" Air-Draulic Cylinders are ideal for the operation of machine slides, drilling heads, work holding tables or machine operations requiring controlled movements. Write today for Bulletin 470 giving complete information.

LOGANSPORT MACHINE, INCORPORATED

902 PAYSON ROAD, LOGANSPORT, INDIANA

Manufacturers of Air and Hydraulic Devices, Chucks, Cylinders, Valves, Presses and Accesssories

ELECTRONIC DEVICES

(Continued from preceding page)

can be made extremely sensitive in this multi-staged set-up only approximately 15% to 20% of the light beam has to be interrupted in order to actuate the relay in the unit. Consequently, if the optical slit is adjusted so that the image point of focus of the beam of light is only 0.001" in thickness and, as an example, ⅛" in width, the object only has to obstruct 20% of this 0.001" in order to obtain actuation of the photoelectric amplifier. Therefore, this unit offers possibilities as a frictionless limit switch where unusually close tolerances of control are necessary.

In the set-up illustrated, a group of neon tubes are used to represent a counter. A conventional high speed motor switch or stepping switch, similar to those used in your dial telephone exchange, actuates the neon tubes, one after the other. It will be noticed that upon taking the conventional comb and passing it through the image point or focusing point of the beam of light, the motor switch will step in accordance to the teeth of the comb. The motor switch is being used as a counter as a mattter of convenience for demonstration.

This same installation is being used by some of the largest manufacturers of zippers to count the scoops on each side of the zipper to see that they have the same number on each side. An electric counter was developed for these manufacturers which would operate directly in the anode or plate circuit of the last stage of amplification, and when setting up machines it was possible for them to count the right and left hand scoops much more rapidly than was possible by the previous method of laying them on a table and counting them individually.

The same general procedure with an electric circuit to close when the correct neon lamp turned "on", or, in other words, when the motor switch came to the correct point, is being used to determine that actually 144 screws or bolts are placed in an individual package, that the correct number of links are in a section of chain, that the correct distance is covered by rubber used in making false teeth as it is placed between two sections of cloth, as a suitable gauge for the thickness of an air gap between ground and central electrodes of spark plugs, as a frictionless device for measuring four or five different sizes with four or five different units with variations of plus or minus 0.0005", as a means of reading and indicating accurately the bounce of a conventional scleroscope hammer, as automatically reading the indications on a standard dial indicator, as automatically controlling from a pressure gauge when pressure switches were not accurate enough. These are but a few of the applications of the multi-staged photoelectric amplifier in conjunction with a small beam of light and a suitable photoelectric cell unit. It would be impossible to enumerate the hundreds of applications that are made possible because of the advanced design of the optics in the Light Source and the corresponding advanced design in the sensitivity of the photoelectric amplifier to respond to the small variations in light occasioned by the interception of the very narrow beam.

Of course electron discharge devices are being used to time welders, to control the primary circuit of welding transformers and other heavy applications that do not generally fall within the category of the conventional tool or machine design. These applications will not be discussed.

About a year and a half ago considerable interest was shown in the possibility of adapting high speed telephone relays in conjunction with direct current power supply to operate from electrical contacts actuated by gauging devices.

In these early attempts of electric gauging, mechanical lever magnification was used. If it was desirable to automatically sort or grade pieces rapidly to limits of 0.0001", the designer would have a ten to one lever magnification so that the electrical contacts of the gauge would open and close 0.001". This seemed sufficient,

(Continued on following page)

STANLEY No. 566 PORTABLE GRINDER

This rugged, powerful grinder is just what you need for grinding and smoothing welds on the many jobs too large to be taken to a stationary grinder. The powerful Universal motor drives it at 2600 r. p. m. under full load. Seal type ball bearings and nickel steel gears insure trouble-free operation and long life. Ample capacity to take care of any job requiring a portable grinder. No. 565-5" Wheel, No. 566-6" Wheel.
Ask your Stanley distributor for demonstration on this or other Stanley Electric Tools for your work, or write for literature. Stanley Electric Tool Division, The Stanley Works, 149 Elm Street, New Britain, Connecticut.

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Bench, toolroom and portable grinders with powerful motors and Stanley ruggedness.

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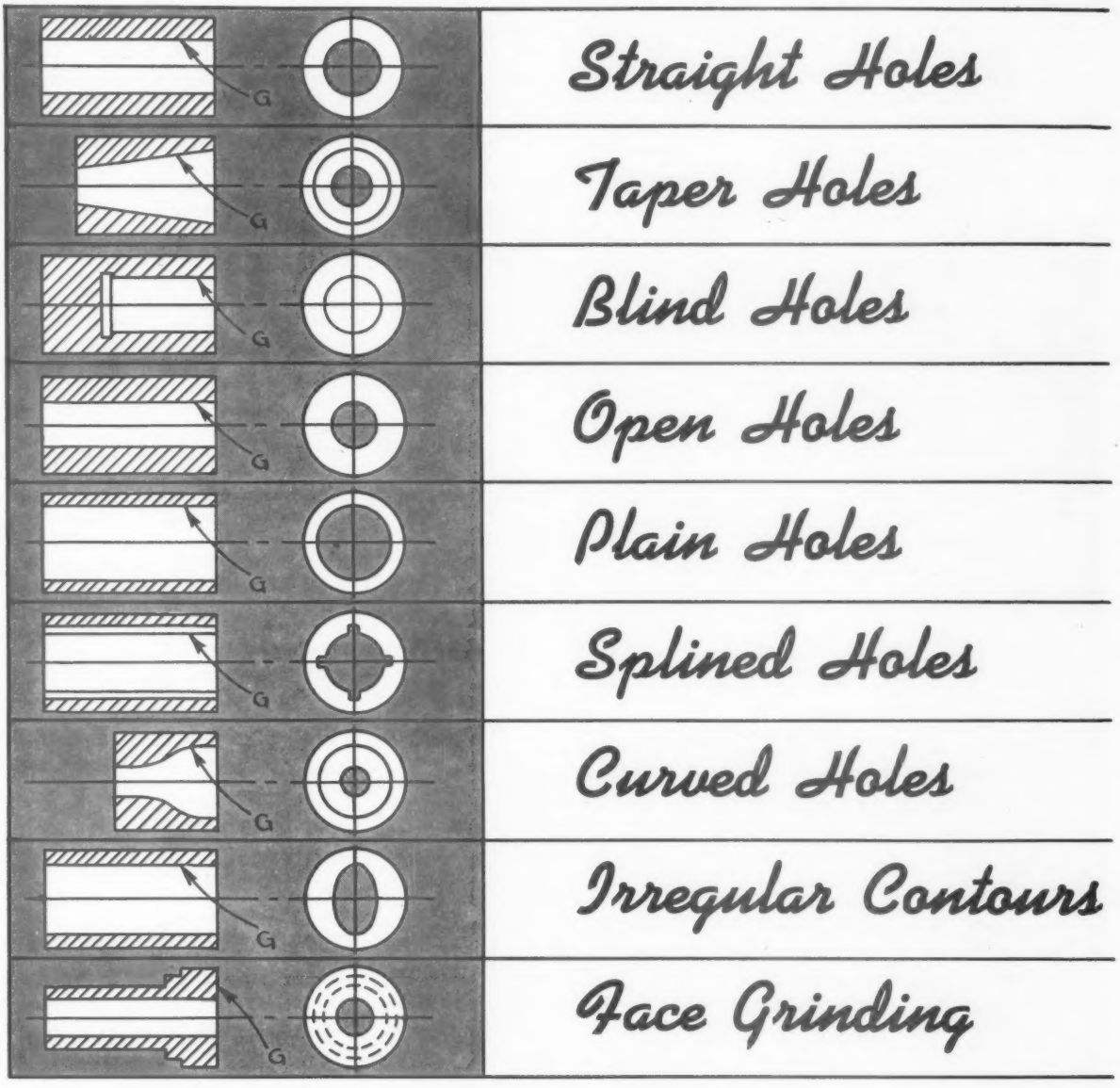
"Stripped for action"—easy to handle—plenty of power.

STANLEY UNISHEARS
Portable and stationary models for all sheet metal cutting.

STANLEY DRILLS
Rugged, powerful, balanced, in sizes to handle your work.

GREATER PROFITS FROM GREATER *Versatility* WITH BRYANT INTERNAL GRINDERS



The versatility of the Bryant line of internal grinders pays real dividends in the job shop or in the production line. Not only will these machines grind the variety of work shown above, but they will grind any of these forms in combination. If you are interested in additional profits on your internal and face grinding jobs, send blueprints or samples to Bryant for complete information.

BRYANT CHUCKING GRINDER CO., Springfield, Vt.

ELECTRONIC DEVICES

(Continued from preceding page)

if, in turn, the operating coil of the magnetic switch, which was to cause automatic rejection or passage, did not consume over four or five milli-amperes (4/1,000ths of an ampere) at 24 to 48 volts D. C. It was found, however, upon actual demonstration and practice that even the few thousandths of an ampere of current at the applied voltage caused oxidization of the contacts.

In general practice, spherical contacts are most widely used where accuracy in contact making is necessary; but it must be assumed from theory that two spheres, when coming in contact and at the first instant of contact, obtain only infinitesimal point contact. Therefore, upon the first infinitesimal point contact the one or two milli-amperes of current that would normally be dissipated in the relay coil are in actuality dissipated at the high resistance of the infinitesimal point contact.

This was first proved in the penetration type paint thickness gauge in which a phonographic needle or other sharp stylus was pushed through the paint film. The metal under the paint film was connected in series with the micrometer screw penetration gauge through a battery and a small flashlight lamp. It was found upon repeated tests, after removing the paint film that the point of the stylus had actually made an indenture in the metal before sufficient energy was dissipated in the balance of the circuit to operate the flashlight lamp. Accordingly the theory was advanced that if the few milli-amperes of current could be reduced to a few millionths of an ampere that this penetration of the metal beneath would not take place.

Several years ago, we introduced a group of film thickness gauges which used, and are now called, "Trigger Circuits". In actuality the stylus, when it came in contact with the metal coating beneath the insulating film, only had to pass a few micro-amperes of current to make the grid of the amplifying tube positive. This amplifying tube in turn passed several milli-amperes in its plate circuit, which in turn, through a magnetic switch, actuated the indicating pilot lamp. Upon thousands of repeated tests it was found that the average operator could obtain reliable readings on the film thickness without any mark appearing on the bare metal after the paint was removed with a reducer, and with accuracy of 0.0001".

Following this development and following the necessity of developing some way of obtaining high speed gauging, the Trigger Circuits were introduced. The Trigger part of the circuit is now being used, not only by one of the largest automotive factories, but also by one of the largest bearing plants for measuring out-of-round, over-all length, diameters, taper, hollow grind, and other measurements that must be made accurately and rapidly and with a minimum upkeep and adjustment of the gauge. The Trigger Gauge itself is merely an advancement over the early method of electrical measurement. It is an advancement because it is faster, more accurate and eliminates the necessity of the operator reading a conventional meter which has been calibrated to 0.0001" or greater accuracy.

In the Trigger Gauge, if it is a hand operated unit, pilot lamps are generally used to indicate under, over and correct size, or two or three sizes either side of the correct size when selective fits are necessary. Accuracy may be held to 0.000025" without requiring a tremendous amount of mechanical lever magnification. This has been possible due to the use of electron discharge tubes as they operate extremely simply with a minimum of upkeep and maintenance.

In the Trigger Gauge the conventional vacuum tube amplifier, as used in the paint thickness gauge, is replaced by a gas filled tube. The only difference between the gas filled tube and the vacuum tube is that upon once firing the tube—or, in other words, making the grid positive—the tube remains in the fired condition and continues to conduct until the anode or plate circuit is opened. This makes an

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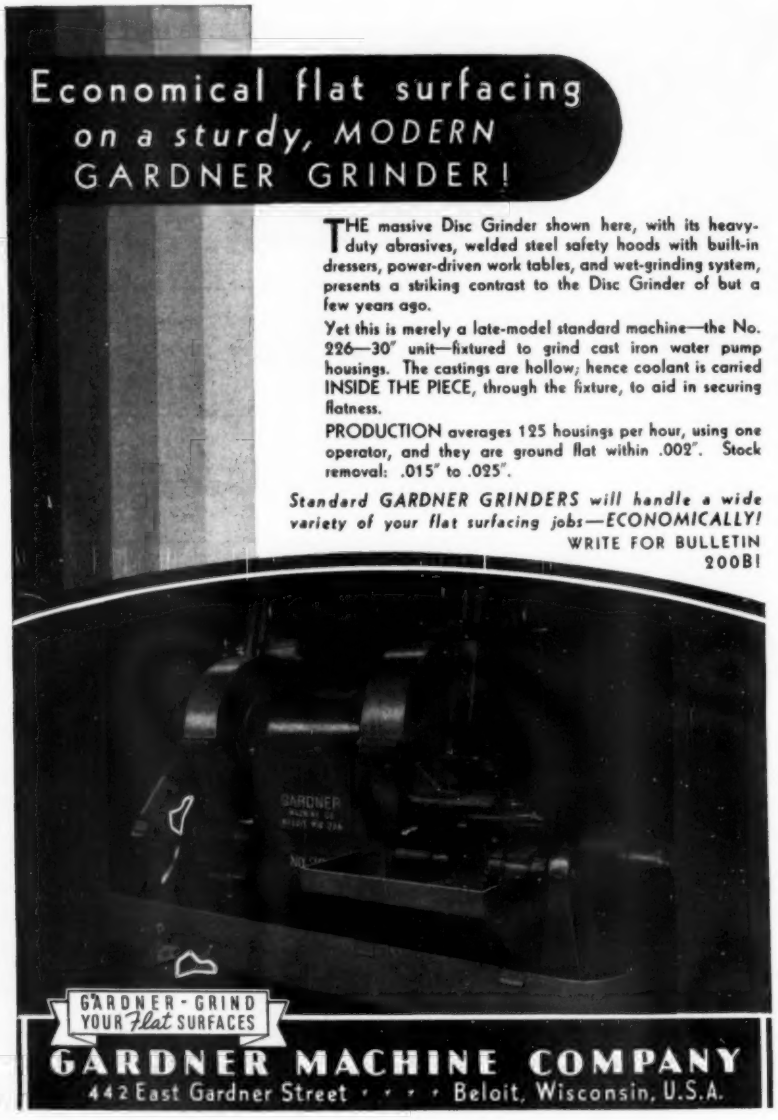
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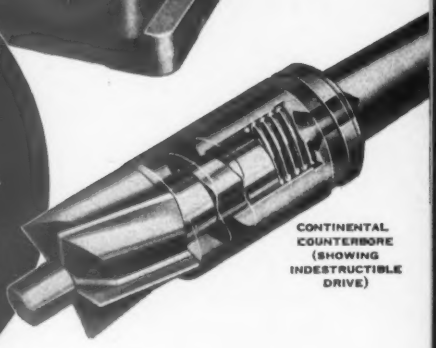

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ELECTRONIC DEVICES

(Continued from preceding page)

ideal arrangement for storing desirable or undesirable limits in an automatic gauge. In a hand operated gauge it also allows the pilot lamps to remain lighted even when the gauge is opened for a desired pre-adjusted period of time. Incidentally, a second gas tube can be used as a timing tube to extinguish all the pilot lamps after the pre-adjusted period of time has elapsed or the pilot lamps may remain lighted until the clamping fixture holding the pieces is completely released. In either case, the function is to open the positive voltage supply to the anode of the aforementioned gas tube. This allows de-ionization of the gas in the tube; providing, of course, that the grid circuit has been returned to its normal known operative point.

At the present time the trigger gauge seems to offer unusually large possibilities. In the first place it is possible to minimize mechanical magnification in the gauging unit itself. In other words, the electrical contacts used for automatic gauging or for hand gauging can be set up to within 0.00005" of each other and as long as they are kept clean they will not operate until infinitesimal contact is made between the two gauging elements. At this time only point contact is necessary because only a few micro-amperes of current have to travel through the gauging contacts. The contacts do not have to be forced against each other and no pressure has to be exerted on the work that is being measured. Greater accuracy can be obtained at higher speed. With the gas tube used in this circuit in place of the conventional low current relay, the possibilities of increased speed are unquestioned. Where a high speed telephone type relay in an out-of-round measurement will operate in 7/100ths or 8/100ths of a second, the gas tube, for doing the same job, requires only a few micro-seconds, or, in other words, only that portion of time required for ionization of the gas in the tube.

In using Trigger Circuits for measuring, it has been found that, particularly in out-of-round dimensions, where the duration of "on" and "off" time of the contacts as the piece is revolved is extremely short, the gas tube is the only answer because there were no relays that would latch in or electrically close themselves and remain closed after the momentary impulse. Trigger Circuits can be built into any conventional gauge. The gauge part will replace constant upkeep and maintenance on dial indicators and other associated equipment. The indication by pilot lamps operating from the Trigger Circuits removes that ever present human element which must determine in their own mind and which must read with their own eyes the variations in the pointer of a dial indicator of electric meter gauges. Therefore, there are less fallacies and less possible inaccuracies due to the human element when hand gauges are equipped with Trigger Circuits.

It has been the experience in producing electron discharge devices to find that many plants have not only requested the electronic equipment, but others have requested complete machines. Some of these machines might be of interest.

Several years ago a machine was produced for sorting Recordak film file. Film filing system is rapidly replacing filing carbon copies, etc. In the Recordak system a copy of the insurance policy, letter or deed is made by photographing on one 16 mm. frame an image of the original document. In some places thousands of these records are made every day. In every 100 foot roll of film there are hundreds of these records. The problem involved itself as to how to find one of these filed records after two or three years. In the past it has been practice to approximately locate the specific record by film footage indicators.

With the photoelectric system it was possible to establish on the preceding frame a series of spots photographed from a blackboard, consisting of white drops electro-magnetically operated. These white drops were in actuality operated

(Continued on following page)

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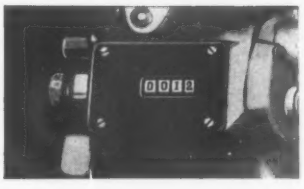

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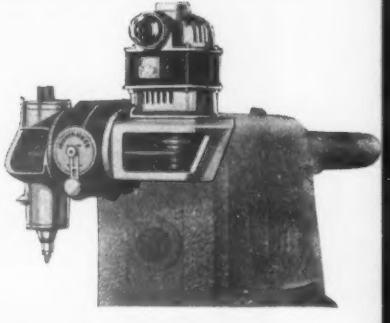

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ELECTRONIC DEVICES

(Continued from preceding page)

from a conventional typewriter keyboard and when an exposure of the desired piece or manuscript was photographed at the same time, on a separate frame, an exposure of the so-called blackboard was made.

When it was desired to find this individual frame, the operator set up, through an associated similar typewriter keyboard, a series of electrical circuits and the projector was started with the frames of spots being projected on a group of 100 photoelectric cells. The 100 photoelectric cells in turn actuated 200 tubes of amplification. It might be interesting for you to visualize a 200 tube radio set in your home.

When the correct group and sequence and the combination of spots of light were projected on the correct group and sequence of photoelectric cells previously set up through the electrical circuit outlined, the projector would stop and at that point was the letter and the file desired.

The machine was later built with electron tubes so that it would multiply, add, subtract and divide.

Electronic equipment has uses from the business machine just described to photoelectric equipment in conjunction with suitable conveyors for automatically sorting rock salt and rejecting undesirable or blackened pieces.

Approximately three months ago a machine was built which was designed to not only hydraulically clamp, but also, through electron discharge devices and photoelectric cells, to indicate the bounce of a hammer on a tappet. The machine was originally designed to scleroscope each tappet in two positions. If upon scleroscoping the first position a spot was selected that was determined to be soft because the hammer did not bounce high enough, the second scleroscope reading was eliminated and the piece was automatically rejected with those that were too soft. On the other hand, should the first indication be that the piece is hard enough, the hammer of the scleroscope would bounce into the beam of light and the piece would be scleroscoped the second time with the photo tube indicating and storing the impulse as to whether or not the scleroscope hammer bounce was high enough. In other words, these tappets that proved or indicated themselves as being hard enough upon first scleroscoping operation were automatically subject to the second scleroscoping operation. If they passed both stages, they were indexed through the rotating mechanism of the hydraulic machine to a position where they were ejected as being desirable. All pieces that either failed in the first or second attempt to pass the hardness test, or, in other words, did not allow the scleroscope hammer to bounce to the desired height, were rejected automatically at another station.

Just a few weeks ago a complete hydraulically operated machine was shipped, which used form mandrels to bend the two ground electrodes of spark plugs. After the forming operation had been completed the mandrels came forward and gapped each individual ground electrode of the spark plug to 0.026" to 0.028". The actual operation of the control of the gapping was performed through Trigger Circuits. Upon each ground electrode being gapped to the desired distance, the two mandrels, around which the ground electrodes had been bent, were retracted fully to allow extraction of the completed spark plug from the die of the machine.

This machine could be built without the use of electron discharge devices, but had it been built without the use of tubes, it is safe to say that it would require approximately six to seven seconds for the complete sequence to take place; but with electron discharge tubes controlling the sequence, the measuring of the gap and the corresponding retraction of the gappers, the machine cycle speed from the time the plug was inserted until it was ready to be removed was less than 1.75 seconds.

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Final Report

A.S.T.E. Survey on the Shortage of Skilled Men

THIS survey by The American Society of Tool Engineers was made to determine the approximate needs of Industry in the Tool Engineering field. Our Society has been flooded with calls from Industry in many sections for skilled Tool Engineers with very few available. This indicated the necessity for establishing sources of supply and of obtaining information as to requirements.

Since the work of the Tool Engineer would be barren without an adequate supply of craftsmen to produce his production equipment it was decided to study the shortage of tool and die makers and skilled mechanics also.

The survey was made with questionnaires sent to a cross section of the metal working industry in all sections of the country and the information obtained represents a cross section of industrial opinion as well as total industrial requirements in the skilled help mentioned, based on cross section figures.

It was not and will not be the intention of this Society to determine specific requirements of specific localities, neither will we step outside of the metal working sections of industry. However, the values shown for the metal working industry, which is approximately 15% of all manufacturing plants, provide interesting speculation on the total effect of the indicated expansion of operations.

The survey was made among those plants included in groups 11, 12, 13, and 14 of the 1937 Biennial Census of Manufacturers. These groups included iron and steel and their products, non-ferrous metals and their products, machinery, and transportation equipment. Falling in these groups are a total of 25,551 plants employing 3,470,606 people and an annual value of products equal to $22,141,133,789.

What are the Results?

How many plants are already short of skilled help?

Need Tool Engineers	26%
Need Tool and Die Makers	52%
Need Skilled Mechanics	60%

How many skilled men are needed at once?

Tool Engineers Needed	32,570
Tool and Die Makers Needed	127,750
Skilled Mechanics Needed	408,816

How many plants plan to increase operations?

During the first half of 1940	53%

How many additional men will this expansion require?

Tool Engineers Needed	78,208
Tool and Die Makers Needed	281,060
Skilled Mechanics Needed	332,160

How many plants are trying to relieve shortage?

Plants having apprentice training programs	30%
Plants training some men in other ways	41%

Is This Shortage General?

How many plants need additional Tool Engineers?

New England States	25%
Middle Atlantic States	31%
North Central States	25%

How many plants need additional Tool and Die Makers?

New England States	57%
Middle Atlantic States	62%
North Central States	51%

How many plants need Skilled Mechanics?

New England States 43%
Middle Atlantic States 69%
North Central States 64%

How many plants are planning expanded operations?

New England States 65%
Middle Atlantic States 55%
North Central States 54%

Note: New England States include Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut; Middle Atlantic States include New York, New Jersey, Pennsylvania; North Central States include Ohio, Indiana, Illinois, Wisconsin, Michigan.

What Caused This Shortage?

THREE principal causes of our present acute shortage of skilled men in industry were determined by summarizing the answers to question six of the survey questionnaire. Since the answers were made by men who are faced with the problem of getting out production, of using such help as can be had and of training the help available in their respective localities to their respective needs it may be assumed that they have some knowledge of the situation.

1. Generally it seems that our Industry and our Educational Institutions have gradually drifted apart over a period of many years until it is difficult for either to understand the problems of the other. The primary function of Education has been to train young men for so called "white collar" jobs in an era when the need for such volume of "white collar" workers does not exist. In too many instances the vocational school has been recommended to backward or incompetent students thus encouraging a belief that vocational training is intended for backward students. Vocational divisions too often have old, obsolete and meager equipment and the vocational course has not been modified to keep pace with the developments in industry. In too many instances a scholarly type instead of an engineering type has supervision over vocational training.

These criticisms are general and must not be interpreted to mean that there are no schools doing a satisfactory job of vocational training. We find some of them doing a wonderfully valuable work but all too few of them.

2. Union Labor's belief that scarcity brings prosperity has been applied in connection with apprentice training in industry and in many instances they ban such type of training or restrict it to very small proportions. Their argument has been "why train more men when there is not enough work for their members" and "the employer will use apprentice plans to obtain cheap help".

Unfortunately recent developments in the Union Labor field have not considered ability as a requisite for union membership. Excessive zeal for union membership employment and seniority rights have crowded ability to one side as a consideration for industrial employment. These conditions are felt most in those industries or plants where intensive union organization work has been under way.

3. The depression years, which have brought regulation after regulation and tax on tax have made industrial training difficult and in many instances impossible particularly among small plants. Also the gradually decreasing production volume and the decreasing total number of plants during depression years made industrial training less necessary. Very large plants have been able to and have continued to operate their own training schools while supporting an ever increasing tax load for public instruction. Small plants have not been able to do this and the total volume of all small plants looms large in comparison with the total volume of all large plants.

There is a belief among small plants that the great tax cost for public instruction should provide for the training needed.

Information of a more optimistic nature is to the effect that in some industrial localities, industry and vocational schools have been working very close together with the vocational school teaching as much as they can of what industry requires and industry taking their product and completing the training. Such cooperation and accomplishment should be general throughout the country.

What is Being Done About It?

THE rapid change of events in Europe and subsequently in the United States since the Annual Meeting of the A.S.T.E. was held in New York in March has made the newly formed Educational Committee one of the most important ones in the Society. Since that time Hitler, has blitzkrieged through Holland, Belgium, and France and has been working up to an assault on England. Sensing a danger to its own way of life, were British seapower to be destroyed, the United States has launched the greatest naval building program in its history and has begun to build its first mechanized army of huge proportions. A year or more ago the aircraft industry began expanding and has been doing so in geometric progression. Leading industrialists have been called to Washington, to bring mass production techniques to the defense program.

Meanwhile, this survey conducted by the Amer. Soc. of Tool Engineers has indicated a shortage of skilled men in all ranks of the army of men required for the production of planes, engines, tanks, guns, battleships and munitions. There is a shortage of Tool Engineers, tool and die makers, skilled mechanics and production workers. Somehow or other, men to fill these positions must be found within a relatively short time and others must be trained as rapidly as possible to fill the gaps in the ranks left by men advanced to higher qualified duties. It is obvious that the A.S.T.E. is in a unique position to be of service to our country in facilitating such a program of industrial mobilization. In fact it has already

(Continued on following page)

WHAT IS BEING DONE

(Continued from preceding page)

offered its services in this respect to William S. Knudsen, head of the production division of the National Defense Advisory Commission at Washington.

Fortunately, our Society had begun the formulation of a program for Tool Engineering education almost a year ago. During the presidency of J. R.Weaver, an Educational Committee of the A.S.T.E. was appointed to work up a long term program along such lines. This Committee first attained national recognition during the Annual Meeting held in New York last March when an entire technical session was devoted to the many phases of this broad subject. Two representatives from industry, one high school supervisor and an engineering educator representing the colleges presented papers, each outlining a separate viewpoint. The lively discussion that followed indicated a keen interest in this subject on the part of the membership and an appreciation of the fundamental importance of the problem. It was one of the many demonstrations at this Annual Meeting of the growth in stature of the Society as a whole.

Herbert D. Hall, past chairman of the New York-New Jersey Chapter was appointed chairman of the Educational Committee by Jim Weaver, and Mr. d'Arcambal, asked him to continue this work when he took over the presidency of the Society. Mr. Weaver, is a member of the Committee, along with other stalwarts like our founder O. B. Jones and Otto Winter, long an advocate of setting up courses in Tool Engineering on a college level. J. P. Wiley of McKeesport, Pa., was appointed because of his interest in personnel work.

Realizing the difficulty of carrying on a program of this kind with infrequent meetings owing to the scattered geographical locations of his national committee, Herb Hall, last March, set up a local group known as the Educational Program Advisory Committee, made up largely of members of Chapter No. 14. This subcommittee is at present composed of Herb Hall, Frank C. Sheeley, another past chairman of the New York-New Jersey Chapter and chief tool designer at Hyatt Bearings Division of General Motors; Frank R. Wodtke, apprentice supervisor at Hyatt; Charles L. Thomson, chief tool designer of Singer Mfg. Co.; C. B. Carlson, manager of the Ediphone Division of Thomas A. Edison, Inc.; Edward N. Wallen, who is connected with one of the New York City vocational schools; and Frank J. Oliver, Associate Editor, The Iron Age, who has been acting as secretary of the Advisory Committee. This local group has been meeting monthly since March, the last meeting having taken place on August 27. As the summer wore on even more frequent meetings were held by Messrs. Hall, Sheeley, and Wodtke, to whip into shape an outline of a high school course that would be useful to a young man desiring a career in the metal manufacturing industry.

The long term program as outlined at the first meeting of the sub-committee has been divided into four parts, covering a study of the following:

(1) The requirements of industry.

(2) The educational facilities available.

(3) The educational facilities ultimately desired or feasible.

(4) The candidate himself—his aptitudes, his interests and his ambitions.

As might be imagined the first steps in such a broad program are largely fact finding and in the beginning, to define the problem, the survey of the requirements of industry was largely limited to the local area. Since then the National Office of the Society has made a nation wide survey and individual sub-committees are being set up in each city where there is a chapter to discover the detailed needs of local industrial plants as regards the shortage of Tool Engineers, tool and die makers and skilled mechanics. At the same time, the local educational committees, which each chapter chairman has

(Continued on following page)

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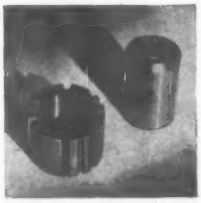

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WHAT IS BEING DONE

(Continued from preceding page)

been asked to set up along the lines of the nucleus group in New Jersey, have been asked to invite criticism (from school supervisors and directors of industrial training programs) of the tentative four-year high school course that has been worked out by the Educational Program Advisory Committee.

After all the criticisms and suggestions are returned to this committee, the proposed course will be revised and presented for adoption by the Society at its Semi-Annual Meeting in October. At the same meeting Herb Hall, will make a complete report on the data uncovered by his Committee to date.

While it is realized that Tool Engineering education may be carried on at many levels, at the start the Committee has concentrated on high school courses and apprenticeship programs carried on in industry. Information has been obtained from a dozen leading industrial firms on their apprenticeship courses and one Middle West concern has placed at the disposal of the Committee a survey of 36 apprenticeship training programs. The Federal Committee on Apprenticeship Training has also cooperated in this phase of the investigation.

After receiving this information on apprenticeship training courses, Frank Wodtke, who handled this phase of the program, wrote the same companies asking for data on where apprenticeship graduates ultimately went in industry. Although only a few companies followed through on such graduates, some surprising results were brought out, indicating that from thirty-five to forty-three per cent of graduates of a machinist apprentice course ultimately went into Tool Engineering work and that *ninety per cent* of graduates of a draftsmen course conducted by a machine tool builder were found working in jobs that could be classed as Tool Engineering. This is why the committee is placing such emphasis on a high school course that will enable a boy to slip into an apprenticeship program.

During the last six months the committee has drawn on considerable outside assistance, particularly on the part of men engaged in personnel work in industry and in vocational training programs. In fact the Personnel Research Federation, through its director, Dr. Charles S. Slocombe, has offered to have key personnel men in the various industrial centers establish contact with the local educational committees of the A.S.T.E. that are being set up.

While the original purpose of the committee was and still is the laying of the ground work of a long term educational policy, the emergency defense program has required that steps be taken to speed up the whole program where feasible in industry, but obviously not in the high school stage. Already, the committee has uncovered some pertinent information on intensive training programs and expects to make available to industry the results of its survey, now in the initial stages.

Running through the many discussions held by members of the advisory committee has been the question of just what is a Tool Engineer. A surprising amount of disagreement was at first indicated, but by means of a thorough analysis the committee believes it has been able to identify the species, no matter what disguise the individual might wear in the form of an occupational title. The study has entailed the correlation of subordinate grades of work that ultimately lead into fully qualified jobs in Tool Engineering. These subordinate jobs in a typical production engineering set-up as pictured in an organization chart of a metal working firm indicate the places in the organization from where men might readily be drawn in an emergency to fill Tool Engineering positions. The same study, which will be published at a later date, also shows where the starting jobs might be found for graduates of apprenticeship courses and the typical channels of advancement into full professional work along Tool Engineering lines.

CUSHMAN Leads . . .

with . . .

- **STATIC BALANCE** of Chucks for use on all new type taper spindles.
- **CHUCKS** are tested for balance, as shown in this photograph, on standard Gisholt Static Balancing Machines which permit balancing accuracy within 2 oz-inches.

ASK YOUR LOCAL DISTRIBUTOR . . . HE KNOWS

Since 1862

Photograph taken in the Cushman Plant shows Chuck on Gisholt Static Balancer. Operator checks against close limits for static balance in all positions.

Watch for our NEXT advertisement which will present another important Cushman development in modern Precision Chucking.

Static Balance of Chucks is just one of the many additional precision features now offered by Cushman at no extra cost to chuck users. It means smoother operation and greater machining accuracy on any turning job. It becomes essential at higher spindle speeds and heavy feeds on latest type high production machine tools.

For the best in modern chuck design and performance, buy by the name . . . specify CUSHMAN Chucks.

THE CUSHMAN CHUCK COMPANY, HARTFORD, CONN.

Representatives in NEW YORK · CHICAGO · PHILADELPHIA · ST. LOUIS · SAN FRANCISCO · RUTHERFORD, N. J.

Sold in Canada by Canadian Fairbanks Morse Co., Ltd.

CUSHMAN CHUCKS

A WORLD STANDARD for PRECISION

Maximum Efficiency means **MARVEL**

MARVEL Sawing Machines . . . MARVEL Blades

• MARVEL has developed a better System of Metal Sawing comprising a complete line of modern MARVEL Sawing Machines and the positively unbreakable MARVEL High-Speed-Edge Hack Saw Blades.

The MARVEL line of sawing machines includes types that meet every shop and production requirement:

METAL SAWING MACHINES

General Purpose Saws
No. 1 (Capacity 4″ x 4″)
No. 2 (Capacity 8″ x 8″)

Light High Speed Saw
No. 4B (Capacity 6″ x 6″)

Heavy Duty High Speed Saws
No. 6 (Capacity 6″ x 6″)
No. 9 (Capacity 10″ x 10″)

Automatic Production Saws
No. 6A (Capacity 6″ x 6″)
No. 9A (Capacity 10″ x 10″)

Metal Band Saw
No. 8 (Capacity 18″ x 18″)

Giant Hydraulic Hack Saw
No. 18 (Capacity 18″ x 18″)

Because they are positively unbreakable, MARVEL High-Speed-Edge Hack Saw Blades permit far higher speeds and much heavier feeds than are generally used. Actual shop tests show that the use of MARVEL High-Speed-Edge Blades alone, greatly increase output and cutting efficiency, because these patented composite blades stand up and cut efficiently at any speed the sawing machine can attain. Available in sizes for all hack saws, they cost no more than ordinary high speed blades.

Highest metal sawing efficiency comes only in the MARVEL System—in the use of MARVEL Sawing Machines and Unbreakable MARVEL High-Speed-Edge Saw Blades. This combination gives maximum output, economy and efficiency.

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
CHICAGO . . . . . U. S. A.

FREE We will gladly send an engineer to analyze your cutting-off jobs, and make recommendation of the equipment that will most drastically reduce your cutting-off costs.

» » A.S.T.E. DOINGS « «

By IRWIN F. HOLLAND

Inasmuch as vacation period is upon us and most Chapter activities are at the low point in the year, there is a dearth of material for the Chapter Doings Column, and the writer is going to take this opportunity to present a thought to our readers at large.

You may not know that in addition to securing the material for the Chapter Doings Column, it is also the duty of your National Editorial Committee to secure articles of interest along technical lines for this publication as well. Our Chapter Editorial Committees are working on this, but the thought has occurred to us that many of our readers may have some "pet scheme" that they have worked out in tool design, tooling, or gaging, or may have worked out some shop kink which would be of interest and assistance to other Tool Engineers.

One of the greatest values of our publication lies in the exchange of experience, and it would be of great assistance to the Editorial Committee, as well as to Tool Engineers at large, if you could be prevailed upon to give us a write-up on interesting applications as outlined above.

Will you please send in any material which you may have to Earl Johnson, 1205 Paterson Road, Dayton, Ohio, for consideration for publication in THE TOOL ENGINEER.

COLUMBUS

The Columbus Chapter held its meeting in the refectory of Pomerene Hall on the Campus of Ohio State University, July 11. After the business session, Mr. J. L. Longwell, Chief Engineer of the Carboloy Company delivered an interesting talk on the applications of cemented carbide cutting tools. Among the points stressed by Mr. Longwell were: 1. Cemented carbide tools are subject to certain limitations in application. 2. The ultimate effect of these limitations may be circumvented by intelligent tool design. 3. Tool designers should make use of the application and service staffs maintained by the manufacturers of carbide tools.

WORCESTER

The Worcester Chapter is planning a Regional Meeting of the New England Chapters of the A.S.T.E. which will be held in Worcester on September 6 at 5 p.m. at the Worcester Country Club. All New England members are invited to attend this meeting.

Please advise your Chapter Secretary if you plan to attend so that Worcester Chapter will know how many to plan for. Details may be obtained from your Chapter Secretary.

PITTSBURGH

When Chapter Chairman "Wib" Peirce called the Executive Meeting a few weeks back, his one main purpose was to get the boys together and make some real plans for the coming 1940-41 series of meetings. Evidentally, "Wib's" words went home and the boys set out to do their respective assignments.

To date the Membership Committee Co-Chairmen have not had their vacation and began to show some results. They plan to launch an extensive campaign, which promises to be novel and unique. They say they will be ready to open up with their new plan at the first meeting of the Pittsburgh Chapter which is scheduled for Friday, September 13. Some of the boys were a little superstitious, but

(Continued on following page)

Try MAC-IT Alloy Steel SQUARE HEAD SET SCREWS
Here's three times the gripping power of the same diameter hollow set screw! Where machines take terrific punishment, Mac-it square head sets are used because they offer amazing resistance to upsetting of the points and breakage. It's Mac-its for tough jobs.
The Mac-it line gives you 16 standard items, including hollow set screws, socket head cap screws and stripper bolts—all milled from solid bars of Mac-it special alloy steel and heat treated for their particular kind of job.
Write for your copy of the new, revised Mac-it Catalog. Get full details on the only complete line of heat treated, alloy steel screws!
4
THE STRONG, CARLISLE & HAMMOND COMPANY
1392 West Third St., Cleveland · Ohio

WHEN PRECISION GUARDS PRECISION

It is an old saying that "it's a poor workman who blames his tools". But shop foremen know that even the best operator cannot turn out precise and well finished work on a lathe with worn or faulty headstock gears.

To make sure of maintained accuracy at this vital spot, a well-known lathe maker has standardized on carburized Nickel-Molybdenum steels — using SAE 4815 for drive gears and SAE 4615 for the transmission gears.

These two Molybdenum steels, in addition to having the requisite core strength and toughness, carburize to 55-60 Rockwell "C" with minimum distortion. Consequently proper initial adjustment is simple and freedom from trouble due to worn teeth is assured for an extended service period. Thus precision guards precision for years.

Rechecking your own specifications may disclose opportunities for increasing serviceability of the product by a change in materials. You will find our book, "Molybdenum in Steel", helpful. It is sent free on request.

PRODUCERS OF MOLYBDENUM BRIQUETTES, FERRO-MOLYBDENUM, AND CALCIUM MOLYBDATE

Climax Molybdenum Company
500 Fifth Avenue · New York City

MOLY

CHAPTER DOINGS

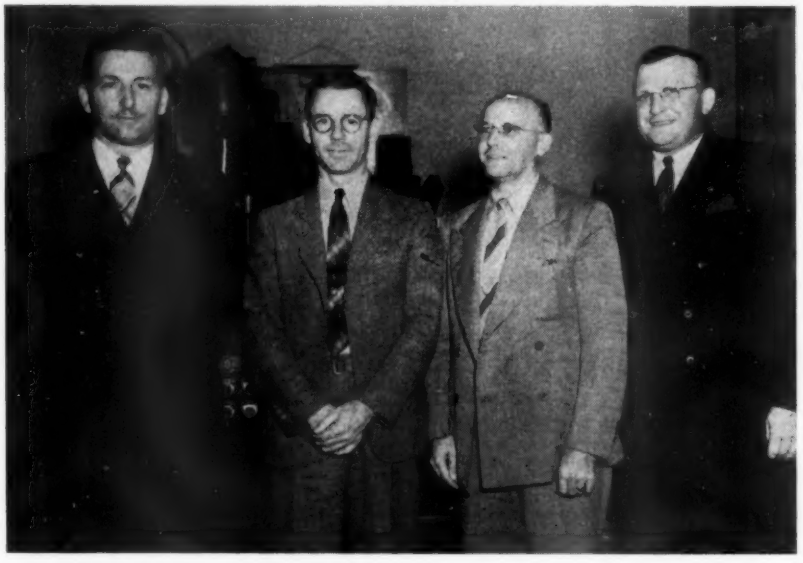
(Continued from preceding page)

Mr. Barney, our Entertainment boss, said this was his birthday and everything would be under control.

To start off with on this aforesaid Friday: During the afternoon there will be the Grand-Open-Turf-Wreckers-Handicap-Tournament at Edgewood Country Club, get your handicaps in early boys. Following this a most excellent program has been arranged with the Honored Guest Speaker of the evening being none other than Major Al Williams whose comments relative to Aviation have been most informative to us. There will also be on hand a Master Trickster, who has the ability of doing some phenomenal feats. They say he is really good.

Of course, there will be a very good dinner to be had and all in all, the fellows who miss out on this Grand Opening of the Season will feel badly when the rest of us tell them about it.

The committee adjourned with lots of pep and enthusiasm about the coming series; the results of the poll for requested speakers are being sought after, and Pittsburgh is off to a flying start with their opening meeting with an eye to the near future in Cincinnati.



Officers of the Southern California Chapter at Los Angeles, left to right, M. W. Seavey, Secretary; Dwight G. Jones, Vice Chairman; Louis Biehler, Chairman; Jack Marvin, Treasurer.

ROCHESTER

This meeting consisted mainly of the activities of the Executive Committee. Chairman John Dense played host to the Executive Committee by having the boys at his home Tuesday, August 13 to discuss plans for the fall meetings. Program arrangements were discussed by Charlie Wallace, particularly in respect to our coordinating with the neighboring chapters (New York State Chautauqua Circuit again? Ed.). Secretary Milton Roessel and Chairman John Dense were appointed Chapter representatives for the Cincinnati Meeting. Joe Schick discussed the holding of discussion meeting in the Fall, and Fred Bittner has accepted part of Charlie Wallace's work on program arrangements.

(Continued on following page)

Use the Tools of Today for the Work of Today!

TO DO THIS AN EVER-INCREASING NUMBER OF SHOPS FIND IT PROFITABLE TO USE THE O K SYSTEM—

O K Inserted-Blade tools are designed to bring milling, reaming, boring and planing up to the exacting speed and precision standards of modern metal cutting practice. Unlike solid cutters, only the blades are made of the more expensive cutting steels. The bodies are quickly and accurately adjustable in line of wear, so that trueing up is simple and easy. The O K System has a "flexibility" not common to any solid tools. In addition to a considerable economy in cutting steels, much time can be saved through having reserve blades ground in advance of the need. It is also advisable to keep on hand a supply of specially shaped blades for special jobs. These are always promptly available from the wide variety shown in the O K catalog, which will be sent on request.

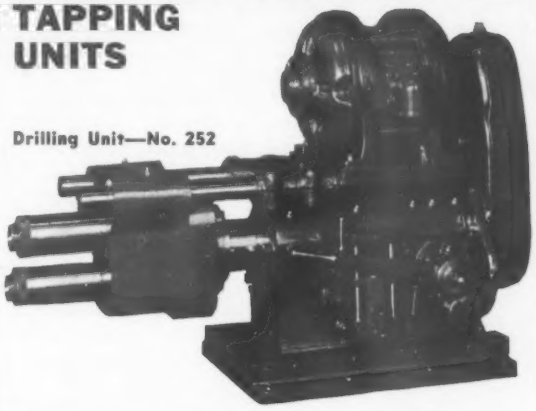
ECONOMICAL FOR LARGE OR SMALL SHOPS

THE O K TOOL COMPANY, SHELTON, CONN., U.S.A.

INSERTED-BLADE METAL CUTTING TOOL SYSTEM

BRADFORD DRILLING and TAPPING UNITS

Drilling Unit—No. 252



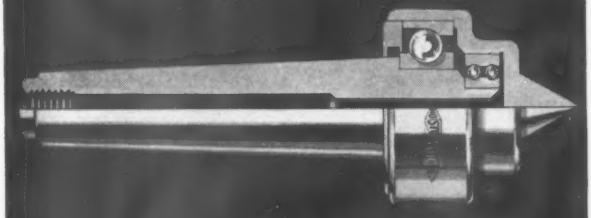
Meet your present high-production demands for drilling, reaming, hollow milling, spot facing, tapping, etc., on one of these units, designed for the express purpose of assembling one or more heads into one machine and mounted at any angle. Made in two types—light duty high speed and heavy duty medium for slow speed and large work, and with motors from ½ to 7½ H.P.

Write for descriptive literature on this and other BRADFORD cost-saving equipment.

THE BRADFORD MACHINE TOOL CO.
Cincinnati (Established 1840) Ohio
Manufacturers of High Grade Engine Lathes and Drilling and Tapping Equipment

Dealers wanted in some territories.

STURDIMATIC HEAVY DUTY LIVE CENTERS ARE



AUTOMATICALLY COMPENSATED FOR EXPANSION, SHOCK AND WEAR ARE ACCURATE, DURABLE

WRITE FOR CATALOG AND FREE TRIAL OFFER

STURDIMATIC TOOL COMPANY
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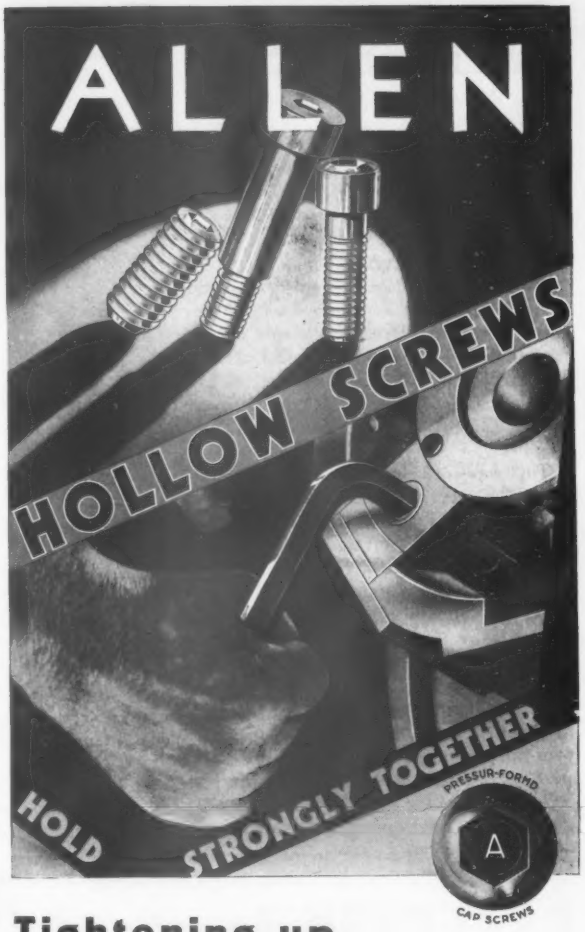


Tightening up

Impetus of rearmament programs presses on to take up the slack in production, and where do you find the "slack" so recurrent as in equipment tie-ups, down-time of machines, lost time of mechanics and operators?

The tightening up of loose operating practices implies tightening up of machine assemblies and adjustments of all kinds — specifically by use of Hollow Screws that HOLD above all others!

It's hardly needful to *name* the screws, in view of the fact that the *same* make of screws has held the Quality market for 30 years, — some of which decidedly were years of "tightening up".

Cold-drawn, "pressur-formd", scientifically heat-treated, precision-threaded, — ALLEN hollow set and cap screws are steeled to the new schedules and specified with the new incentive of PREPAREDNESS.

Your local Allen Distributor will oblige with samples and SERVICE

THE ALLEN MANUFACTURING COMPANY
HARTFORD, CONN., U. S. A.

CHAPTER DOINGS

(Continued from preceding page)

Our Past-Chairman Charlie Codd, Master Mechanic of Ritter Dental Company was badly injured in an automobile accident and is in the hospital. We know that Charlie's friends will be glad to know that he is coming along satisfactorily according to latest reports.

ST. LOUIS

Saturday, July 13th saw the complete evacuation of all Tool Engineers from the City of St. Louis, to an idyllic spot in the foothills of the Missouri Ozarks. There nestling among the hills was a picnic location that would bring joy to a wood nymph and fire the poetic soul of a Tool Engineer.

This was not the first time these laborers in the vineyard of mechanical progress had assembled in the great outdoors. Camera shots and moving pictures in the files of the Chapter testify to the pleasure derived from the picnics at Bob Lafler's Farm in 1938, and at Bob Stephens river club in 1939.

These picnics give the boys that occasional chance to reminisce, and who,—having spent the greater part of his life in the tool game, does not like to mull over the personalities and incidents of the past, as well as the tools of the future?

As one strolled leisurely around the grounds, he caught occasional glances of Dugan, Andrews, Tomasek, and Linders, the past officers of the chapter. These men did much to bring into being a healthy St. Louis Chapter. Strolling along further you found yourself shaking hands

D. D. Burnside, chairman of the St. Louis Chapter.

with Burnside, Sinning, Miller, and Reheis, the boys who are so ably carrying on the work started by the former officers.

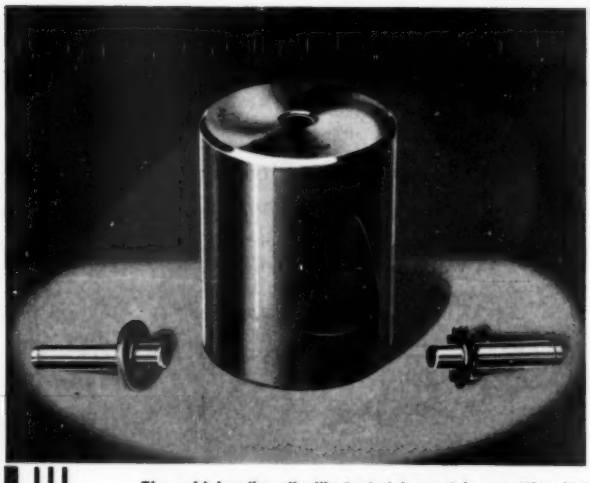
DETROIT

The first Annual A.S.T.E. Moonlight Cruise, initiated by Detroit Chapter, can be summarized in a terse sentence. *It was a huge success.* Like the first A.S.T.E. Tool Show, and other Society trial horses, it established a tradition. While the attendance fell somewhat short of a boatload, due to intensive tooling programs which held many of the boys at the plants, some eleven hundred fifty Tool Engineers and their ladies enjoyed a perfect evening. There was a moon, as scheduled, with the Detroit River and Lake Erie as smooth as a millpond, the gliding vessel creating its own, gentle breeze. Congeniality and conviviality reigned, with entertainment, dancing and refreshments adding to the pleasure. Geo. Whitehouse, Bill Maier and Clyde Mooney, Ent. Ch'man, Treas. and Sec'y., respectively, bore the brunt of the work, supported by Clyde Hause, Chapter Ch'man, and Detroit Committee men. They did a good job, to be followed with encores.

DAYTON

Dayton Chapter's August 9th meeting was a joint affair with the Cincinnati Chapter. The group attended the night game between the Next World Champions and the St. Louis Cardinals. Good Fellowship was enjoyed by those present, all of whom—except one or two—were boosting the home team. Fifty-six Tool Engineers made the trip from Dayton.

BRAEBURN *Equalized* COLDIE HEADING STEEL



The cold heading die illustrated is used in upsetting ½" round S.A.E. 1035 bar stock to make the adjustment screw on a four-wheel hydraulic brake.

Consistently Responsible for IMPROVED PRODUCTION

A 40% improvement in production is of real importance in any plant. That increase was shown after Braeburn Equalized Coldie was adopted as the steel for the cold heading die shown in the illustration at the left. On other work of a similar nature, die-makers have reported that the use of this steel as been responsible for production gains up to 200%.

Braeburn Steels have all been developed to meet best the requirements of specific types of tool and die work. In line with this policy, Braeburn Equalized Coldie Heading Steel offers characteristics particularly suited to cold heading dies. Its exclusive "Equalization" process assures maximum resistance to wear and shock, yet makes machining extremely easy. It is a steel that can be depended upon for uniformity after hardening . . . and constantly uniform quality.

There is a Braeburn "Equalized" Steel exactly suited to your tool or die work. Write for full information.

"THE TOOL STEEL MILL"

BRAEBURN ALLOY STEEL CORPORATION

Braeburn, Pennsylvania • Branches and Warehouses In Principal Cities

This New Combination

CENTER GRINDER and DRILL PRESS

Gives You 2 Machines for the Price of 1

To change from a Center Grinder which dresses the angle accurately and assures accurate grinding on successive operations to a sturdy, accurate Drill Press of ½-inch capacity—simply loosen one bolt, raise dresser up full height and swing out of way. Floor type, can be furnished in any length, complete with motor, diamond and grinding wheel. Four speed V-belt drive to handle most any range of work.

$197.50
F.O.B. DETROIT
Standard grinder, 40" between centers, complete with 110-220 volt motor.

Write for Bulletin No. 11

DALZEN TOOL & MANUFACTURING CO.
511 Leib Street Detroit, Michigan

FATIGUE
CUTS GRINDER RATES

There's a NEU-T-ROL for every size of magnetic chuck. Leading manufacturers will now supply NEU-T-ROL built into your new grinding

equipment IF YOU SPECIFY IT. Or you can install it easily on equipment already in service. Write for full details.

The Defense Program and expanding industries demand higher production rates.

Elimination of operator fatigue is one of the first steps in raising output. When a grinder operator has to hammer, pull or pry parts loose from a magnetic chuck repeatedly, he tires, unnecessarily and wastes valuable time. Tired operators cannot hold high production rates and there's constant danger of slips and mistakes. More than that, precision work may be distorted or damaged, and the chuck face may be marred.

NEU-T-ROL releases the work promptly every time and demagnetizes it. Useful on small chucks, it is essential on heavy work.

WRITE FOR DETAILS

ELECTRO-MATIC PRODUCTS CO.
4038 N. KOLMAR AVE. CHICAGO, ILLINOIS

How to get better production faster

As a Tool Engineer, you know that any man who works with his hands appreciates good tools. You know, too, that the use of high grade tools will always result in a better quality of workmanship—that follows just as naturally as daylight does the darkness.
So what? So this: when your workman is driving Phillips screws, let him drive them with APEX-Phillips Hand Drivers.
And here's why:

APEX-Phillips Hand Drivers are made of a special shock-resisting steel, tough and durable—less lost time from broken or quickly worn points. The blades and lands are precision-made so that they fit the recessed head accurately—the workman doesn't have to baby the job along. Handles have a comfortable grip so that even oily hands don't slip.

As a result, your workman can do more work with less wasted effort—and be "at ease" while he is doing it. And you know that under those conditions a fellow can quicken his pace, if need be, without much effort—or much coaxing.

Here are some of the APEX-Phillips Hand Tools which you can get:

Hand Drivers

General Purpose, and Super Service for self-tapping screws for all sizes of Phillips screws. Available with break- and shock-proof transparent "Superloid" handles. Stubby drivers for No. 1 and No. 2 sizes of Phillips screws.

Service Drives

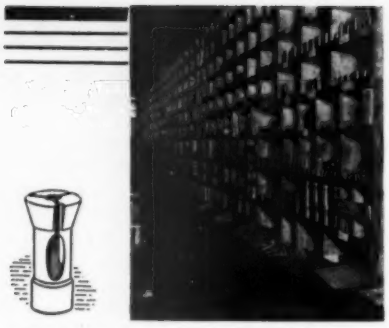
Service Drive Bits for assembly Tee handles, extension shanks, speeder handles, ratchets, etc., having ¼", 9/32", ⅜" or ½" square drives.

Hand Brace Bits

Hand Brace Bits for all sizes of Phillips screws.

Offset or "L" Drivers for service and miscellaneous assembly work.

The
APEX MACHINE & TOOL Company
503 E. Third St. Dayton, Ohio



PROMPT DELIVERY
Of Collets, Feed Fingers
And Other Screw Machine Replacement Parts and Tools

Seldom are there delivery delays when you order Modern Collet standard parts and tools. Complete stocks of blank parts for any size machine are maintained in storage bins such as those illustrated above. And not only do you get service in delivery, but you can always depend on unexcelled service in operation from every part or tool you order.

Write for Our New, Complete Catalog

MODERN COLLET and MACHINE CO.
407 Salliotte Street • Ecorse, Michigan

Handy Andy Says—

FORGETTING tools for an evening, I sailed on the Detroit A. S. T. E. Moonlight Cruise, and there was introduced to various ladies,—wives of Tool Engineers,—found that this column has quite a following among the fair sex. Not that my surname, formally mentioned, evoked more than polite response, but "Handy Andy"! "Oh yes, I read that, and now I rest easy when Hubby goes to a convention." And, sotto voce. "How you men stick together!"

▼ ▼ ▼

Meeting so many feminine readers, I was jolted to a sense of responsibility. And, from the tenor of comment, male and feminine, had cause to be thankful that, throughout the years, the column not only has been an influence of a sort in the Society's growth, but has so presented its activities that the women have confidence in their men. They should have, for while engineers as a class are not angels—working hard, they play hard—they take better to domesticity than do most men who lead more placid lives. And spiritually at least (which is the thing that counts in the final analysis) they are faithful to their homes and families; to them, as a general rule, the home comes first. Well then, when I finally stow the typewriter away, and call it a job, I'll have the satisfaction that I have written of my fellows without malice.

▼ ▼ ▼

Recently, I was one of several dinner guests in a home that, tersely described, can be called the typical American home. It reflected the high standards of living with which we are wont to associate the middle class American family,—more, it typified the spirit of enterprise which has made these standards possible. For, our host and hostess had known their lean years, had suffered reverses and had overcome them, and now, in approaching middle life, can take pride in an achieved success. Sitting there, relaxed after a fine dinner and soothed by the soft notes of an organ, I watched the play of expression on the faces of my hostess and fellow guests as they chatted and exchanged reminiscences. And there came poignantly to mind that here, for the time at least, was peace and security. For it so happened that two of the guests, man and wife, had but recently escaped (to use that term) from the maelstrom that now is Europe; they had been first hand

(Continued on following page)

SWARTZ TOOL PRODUCTS CO., INC.
5259 Western Avenue **Detroit, Michigan**

A DOUBLE INDEXING FIXTURE TO MACHINE PORTHOLES IN CYLINDER BARREL UNDER TWO SPINDLE GANG DRILL. CYLINDER ROTATES WHILE MOVING HORIZONTALLY.

-DESIGNERS-
-BUILDERS-

SPECIALIZING IN
ALL TYPES OF
HOLDING FIXTURES
FOR MACHINE SHOP
PRODUCTION

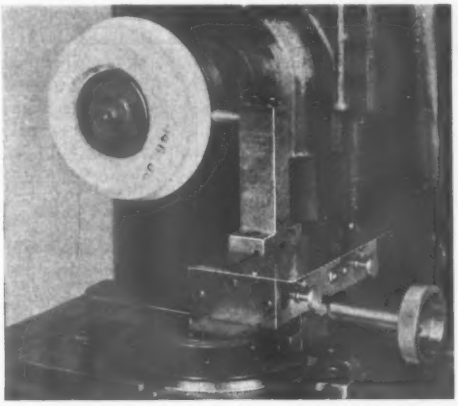
BUILDERS OF STANDARD DRILL JIGS AND FIXTURE LOCKS

ASK FOR CATALOG 238-B

The Vinco Angle Tangent To Radius Dresser for

Internal, External and Surface Grinding Machines

Patented June 5, 1934. Other Patents Pending



Thousands of dollars are lost annually in tool, gage and grinding departments by using obsolete methods in dressing angles and radii on abrasive wheels. The Vinco Angle Tangent to Radius Dresser has the basic patented feature of dressing angles and radii from the same axis without moving the diamond. Angles and radii are always accurate and tangent. It is acknowledged by hundreds of users to be the only accurate, economical and efficient dresser on the market. It is a permanent, precision-made tool and will last a lifetime. It eliminates all worry and uncertainty, and saves 75% in dressing costs. It is fully guaranteed to be satisfactory. *Send for New Descriptive Circular.*

VINCO CORPORATION

9111 Schaefer Highway **Detroit, Mich.**

Impartial Tests Have Proved That

They Cut Faster • Last Longer

PUTNAM HI-SPEED END MILLS—

In actual production tests, it has been proved that speeds and feeds of Putnam End Mills can be increased approximately 30% over those of ordinary mills. In addition, breakdown tests have shown that they will give from 64% to 443% longer service. Putnam lists complete lines of all types of end mills from 1/16" to 2" diameters.

PUTNAM CONTINUOUS PILOT COUNTERBORES—

With these tools you get at least seven times longer life than could be expected of the old style counterbore. The pilot is continuous through the entire fluted portion. Cutters and pilots for body size holes are 1/32" over listed sizes—eliminating seating trouble.

The Putnam catalog includes complete information on these and other Putnam tools. Write for it today.

PUTNAM TOOL COMPANY

2987 Charlevoix Ave. • Detroit, Michigan

SMALL THINGS TO DO THAT WILL HELP YOU AVOID HEADACHES . .

ORDER THAT NEXT LOT OF JIG BUSHINGS FROM ACME

Because:

You can choose from a complete stock of both A. S. A. and Acme Standards.

They are easy to select from our catalog.

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● Here's a tool that cuts surfacing time in half, for it carries a "gang" of 4 cutters that will save 50 to 75% of machining time on big castings and large planing jobs. With each cutter taking a comparatively light chip, the planer will carry a heavier feed and deeper cut than is possible with an ordinary single point tool. The tendency to "break out" at the end of a heavy cut is practically eliminated by the graduated chip.

The head swivels on the shank by means of a closely fitted tongue and socket, and is locked in fixed position by two steel collar screws, while two stop screws make head slipping impossible. The head is graduated so that the tool can be quickly and accurately set to any desired feed.

In over 50 years of specialization in metal cutting tools, ARMSTRONG has developed a complete system of ARMSTRONG TOOL HOLDERS—permanent, multi-purpose tool holders for every operation on lathes, planers, slotters and shapers. Their greater efficiency, strength and cost cutting features have made them the standard metal cutting tools of the world. Use ARMSTRONG TOOL HOLDERS on every operation.

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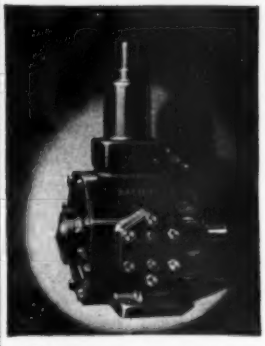
RACINE



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RACINE announces its new 1000-lb. Variable Volume Pump. Advanced in design and construction, it incorporates the special advantages of smooth, quiet operation—needle roller bearings—mechanical seals. An exclusive method keeps vanes hydraulically balanced. Hydraulic governor automatically maintains desired pressure without by-passing of oil.

CAPACITIES—12-20-30 gallons per minute.
VARIABLE PRESSURES—Up to 1000 lbs. per sq. in.
MOUNTINGS—Foot or flanged type.

Let our engineers help you with your hydraulic problems; send for literature today.

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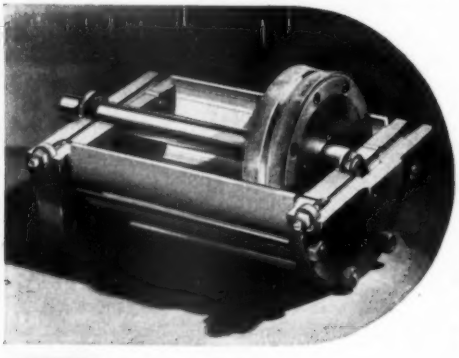
SEND FOR COMPLETE DATA — TODAY!

adjustable "cushioned" air cylinder strokes



T-J CUSHIONED AIR CYLINDER

Complete specifications of Cushioned and Non-Cushioned types are shown in our Catalog 36-A. Your copy will be sent promptly. Address The Tomkins-Johnson Co., 624 N. Mechanic Street, Jackson, Mich.

The action of the cushioned part of an air cylinder stroke depends on variables that are, at best, difficult to determine. This condition can be offset in part by having this cushion action adjustable. Cushion adjusting screws operate to "slow" or increase the speed of the cushion action.

Furnished as standard equipment on T-J Cushioned Air Cylinders, these screws may be readily *adjusted and locked in position on the job.*

this is a* TOMKINS-JOHNSON *product

HANDY ANDY SAYS—

(Continued from preceding page)

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Personally, I have no prejudices against any of the peoples of Europe, rather, have an abiding compassion for all, aggressor as aggressed. Each,—as far as the common people are concerned—is the victim of circumstances shaped by blundering politicians and selfish interests. I admire the sublime courage and dogged tenacity of the English, but suggest that it takes courage to attack as well. No nation, it seems, has a monopoly on courage. But consider that, in Europe as here, there are homes where peace was designed to dwell, and that these homes now know no security; there, the peal of an organ may be but a prelude to destruction. And somehow, in my heart, I have a feeling that the agents of death breathe a prayer that their bombs may spare civilians; theirs not to reason why, but to obey orders and stifle emotion. And our duty, should we become involved, is to win at any cost! Only, as I see it, ours is not a problem of offense but one of defense; unprepared to aid the democracies of Europe even had we been so minded, we can only arrive too late should we enter now. In my opinion, only a miracle can save England now; the conquest may be history by the time this reaches my readers.

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is the essence of *Preparedness*

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For some years CERROMATRIX, the low-temperature-melting alloy that expands slightly on solidifying, has made it possible for die makers in many well known metal-working plants to simplify the intricacies of die design and production and to reduce — enormously in some cases — the amount of time required to make a die. It's well worth your looking into at this time. Send for our new free Cerromatrix Manual.

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The valve tappets illustrated are made of S.A.E. 3140 and have a hardness of 43 Rockwell "C", yet KENNAMETAL machined 250 of these pieces per grind of tool, at 730 ft. per min. cutting speed (cobalt chrome alloy machined 25 pieces per grind of tool at 240 ft. per min.). A tungsten carbide tool used on this job did not stand up under the eccentric rough cutting, while the KENNAMETAL tipped tool remained intact.

Bulletin 710, just printed, explains in concrete terms why KENNAMETAL is the best tool material for machining steel of all hardnesses up to 550 Brinell. Write for your free copy **today.**

*KENNAMETAL is an intermetallic compound of tungsten-titanium carbide possessing superior strength.

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600 LLOYD AVENUE
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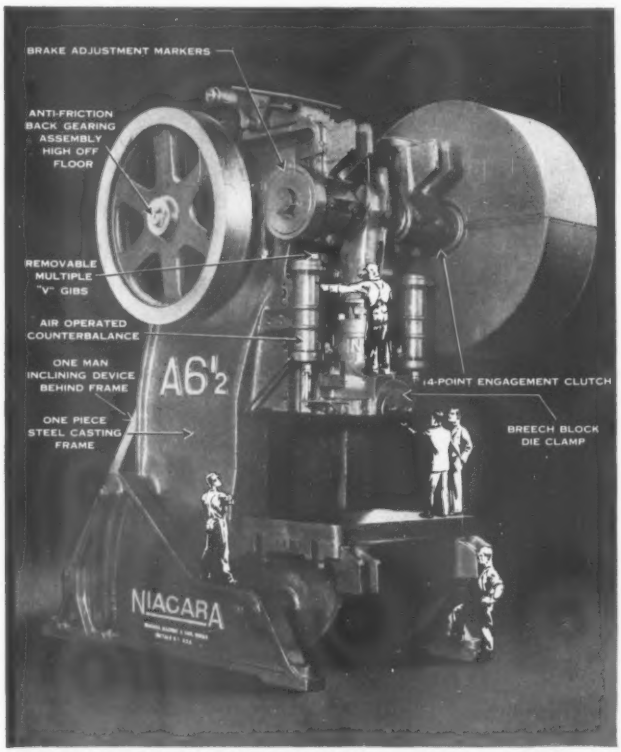

How Niagara Presses Lengthen the Life of Tools You Design . . . .

Niagara Master Series "A" Inclinable Presses lengthen life of dies by strong, rigid frames . . . heavy slides with breech block die clamp assuring adequate support for die under pressure . . . multiple "V" gibs . . . instant acting 14-point engagement sleeve clutch with built-in single stroke mechanism . . . easily operated one-man inclining device.

SLIDES HAVE MULTIPLE "V" GIBS

With flexibility in feeding stock and discharging work,—these presses have proved to be profitable investments in production of an endless variety of metal stampings. Capacities from 5 tons up to 190 tons. Immediate delivery from stock. Write for Bulletin 58 H.

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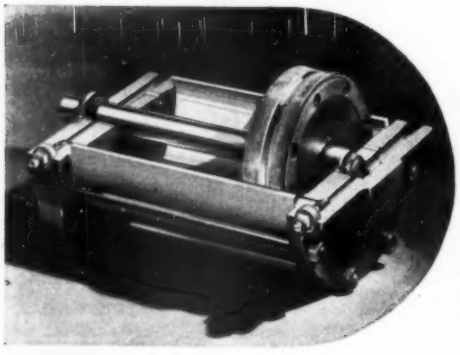
adjustable "cushioned" air cylinder strokes



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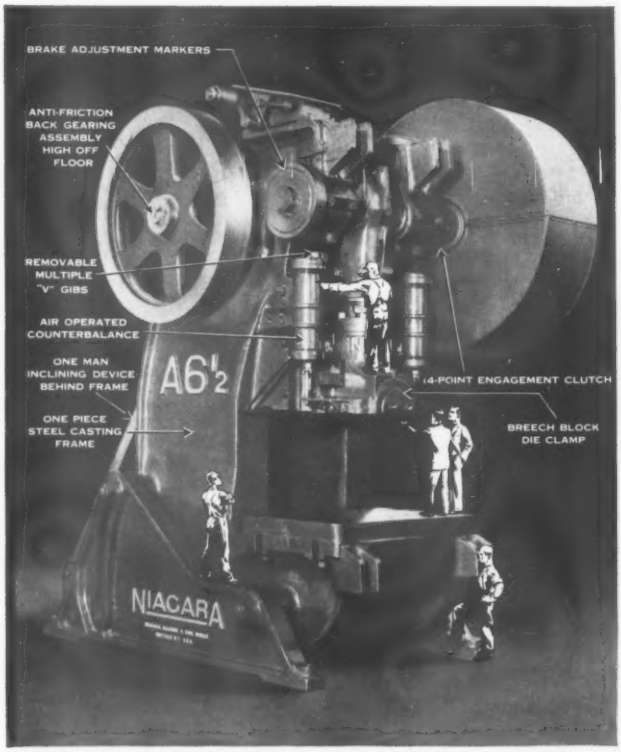

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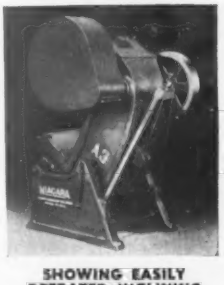

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HANDY ANDY SAYS—

(Continued from preceding page)

practical engineer) that America's coastlines can be so defended, at a comparatively minor cost, that no foreign force or combination of forces, however powerful, can effect a landing on our shores. And certainly an advantage in planes, to a defender, backed by adequate coastal artillery, is the one sure deterrent against invasion by water. And just as surely, an advantage in tanks is a barrier to assault by land. Let us build tanks and planes, then, for today the conquest of nations, as their defense, is effected by the speedily mobile weapons of land and air.

▼ ▼ ▼

Why the slow but intensive program for a navy? A battleship costs as much as four hundred planes; one can sink a battleship which is then voided as an arm of defense, while the planes that escape are a menace to the defenders. Well, a navy means steel, and perhaps there are interests that would have the government buy steel. Big Business in France, you know, also wanted to sell steel and prevailed on French politicians and militarists to build the Maginot line. Had the same steel gone into tanks and planes France might be free today. Instead, the invaders heaped the crowning insult on the defenders by ignoring the "Imaginary Line"; they just hopped it and skirted it. And there she stands, a colossus of steel and concrete, an all but eternal monument to selfish interests and to political as military stupidity. May we build no "Maginot" lines!

▼ ▼ ▼

Finally, there is the choice of a national leader for the next four years, four years that may either change our social and economic structure entirely or restore it to the principles upon which this Republic was founded. Now, I am not plugging for either candidate, although privately decided in my personal choice. The point is that the leader elected will be the choice of the majority of the American people, and once that choice is made our national salvation depends largely on national unity. We'll have to stand behind the man, will have to subordinate political as personal difference to the welfare of the state. Nevertheless, we may bear in mind that the peoples' choice will be a man, and as such fallible. It is entirely within our province to suggest measures which, with our knowledge of mass production and our powers of trained analysis, take the short cut to a desired end. That goal is, primarily, the preservation of the American home, which in turn rests on the foundation of the American system of free enterprise. Until a better system is presented, we'll retain it.

H. A.

TUNGSTEN CARBIDE TIPPED SPECIAL TOOLS

FOR:
BORING,
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ROLLER DRIVE

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AUTOMATICALLY compensates for machine spindle misalignment, eliminating over-sized or bell-mouthed holes.

Helps produce unbelievable accuracy on both new and old equipment.

Furnished with male or female taper, straight, threaded or special shanks to fit any machine used for tapping or reaming.

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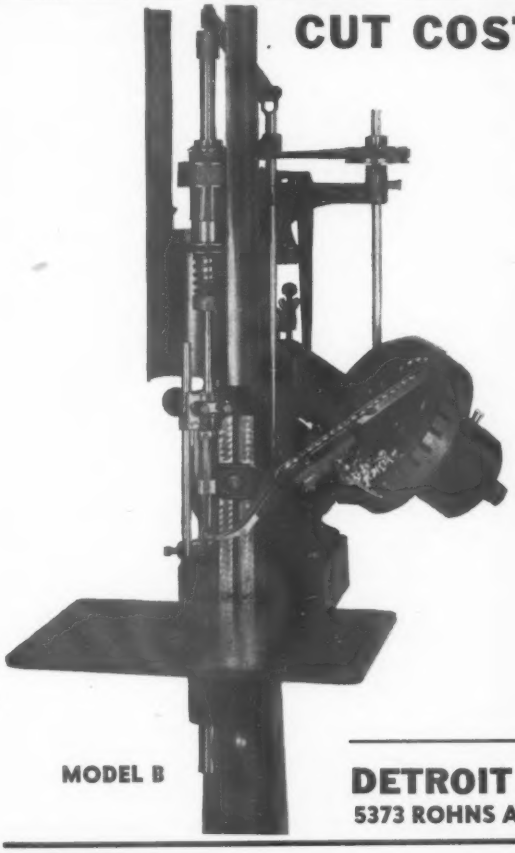

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CUT COSTS-INCREASE PRODUCTION

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DETROIT POWER SCREWDRIVERS

These Magazine Feed Power Screwdrivers Drive Screws Faster Than Ever Before

Machine screws, wood screws, brass screws, aluminum screws, self-tapping screws, drive screws, cap screws, special screws, washer assembled screws

Standard heads, special heads, Phillips heads, slotless heads.

Three Models Available

which provides handling a wide range of screw sizes. From a No. 2-56 screw to a 5/8" cap screw.

UNIFORM TENSION—NO MARRING OF HEADS
No stripping of threads.

DRIVING TIME: 1 to 2 seconds per screw.

SEND SAMPLES FOR PRODUCTION ESTIMATES

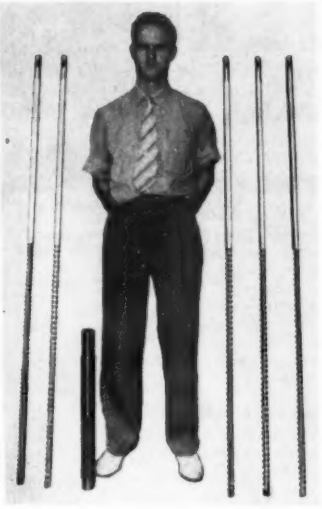
DETROIT POWER SCREWDRIVER COMPANY
5373 ROHNS AVENUE DETROIT, MICHIGAN

23 INCHES *of square hole!*

Customer desired to finish a 1" square hole in a 23" long AMPCO BRONZE part. Size had to be held to .001. Hole had to be straight and high finish was required.

HOW WOULD YOU DO IT?

AMERICAN furnished a set of five pull broaches which are giving satisfactory results in every respect. If you have a similar problem, we urge you to take advantage of our experience.



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"UTILITY" PNEUMATIC GRINDER
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Steel Housing (for Safety)

Special Grease Sealed Bearings
No Lubrication Required

Adaptor Furnished for Use in Tool Post of Machine for Stationary or Internal Jobs

Other Models, Also Air Line Filters and Automatic Air Line Lubricators

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Our work is consistently the finest, and the widest range, in this industry.

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THE Passing Parade

Col. Frederick H. Payne has resigned from the Greenfield Tap and Die Corp. board of directors to become chief of the Hartford Ordnance District of the War Department with headquarters in Springfield.

Howard M. Hubbard of Cleveland, Ohio has been made President of Greenfield Tap and Die Corporation, succeeding D. G. Miller who became Chairman of the Board. Mr. Hubbard, a Harvard man, has been Secretary-Treasurer of the Harris-Seybold-Potter Company for the past ten years. The Corporation regretfully has accepted the resignation of Francis A. Smith, for several years Vice President and General Manager.

HOWARD M. HUBBARD

Carl Oechsle has been named general sales manager of the Holyoke Works of the Worthington Pump & Machinery Corporation, according to Harry A. Feldbush, vice president and general manager. Mr. Oechsle, sales manager in the Washington area for the past five years succeeds W. A. Neill, who has left for New York.

Charles J. Marks was made Chief Tool Engineer of the United Aircraft Corporation last month. At the same time Arthur A. Merry and Frederick L. Woodcock were made Chief Tool Engineer of Pratt & Whitney Aircraft Division and Hamilton Standard Propellor Division respectively.

Mr. Marks was one of the first employes of Pratt & Whitney Aircraft and for many years he has been production engineer for them. Fred Woodcock has been with Hamilton Standard since 1936 and was in charge of tool designing prior

"ROCKWELL"
Motorized
HARDNESS TESTER

Compared to hand operated tester, speed is gained with no loss of accuracy or other merit.

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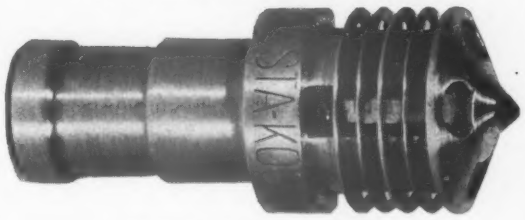
Precision Diamond Tools



For Accurate Work

The illustration above shows the effective design of the STA-KOOL Diamond Tool Holder.

STA-KOOL—Dissipates Heat
Prolongs Life
Reduces Cost

Write for further information about STA-KOOL—"Tool Engineered" for precision.

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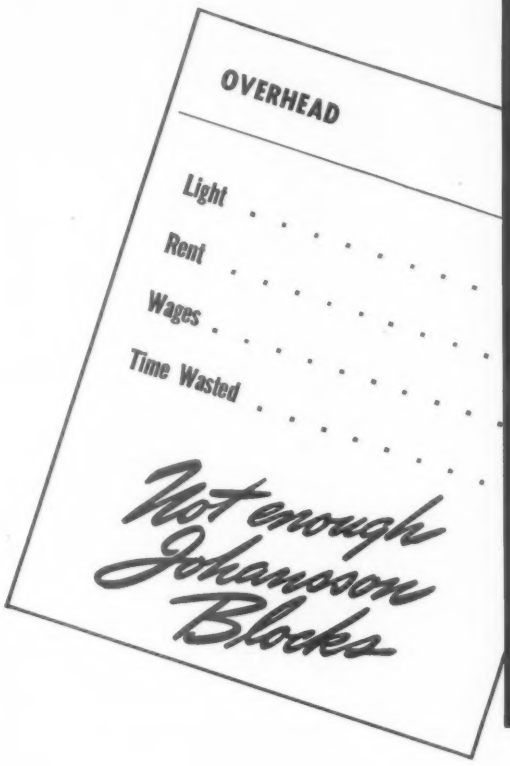

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Individual Johansson Gage Blocks cost as little as $3.50. Sets range from $23 with case. Most Johansson Blocks are available chrome-plated.

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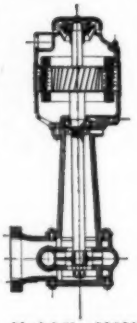
Like all fine tools Ruthman Gushers are precision built to withstand constant, hard use. That is why leading machine tool builders specify Gushers.



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A complete line of Coolant Pumps from 1/30 to 2 H.P. in types and capacities up to 200 gal. per minute, a pump for every machine tool coolant requirement you may have.

THE RUTHMAN MACHINERY CO.
542 E. FRONT ST., CINCINNATI, OHIO
LARGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS

to his promotion. Arthur Merry has been assistant production engineer with Pratt & Whitney since last June.

C. C. Kordenbrock, formerly with the Lodge & Shipley Machine Tool Co., has been associated with the Kordenbrock Machinery Company of Detroit as a Sales Engineer since the middle of last month.

Having served 40 years, John A. Brown has retired from Heppenstall Company, Pittsburgh, Pa., where for the last 10 years he was Special Service Representative calling on the trade in the interest of the company's shear knife business, according to an announcement made by S. B. Heppenstall, Jr., General Manager of Sales.

Harry E. Reith, formerly with Brooks Oil Company, has been appointed to the position previously held by Mr. Brown. Mr. Reith served as Master Mechanic during the construction of Jones & Laughlin's 96-inch continuous strip mill and prior to that was with Wheeling Steel Company in a similar capacity, it was announced.

Died

The end came to one of the most fabulous careers of this century with the death of Walter P. Chrysler, Sr., 65, at his home in Great Neck, L. I. on Sunday, August 18. This man who started work in his native Kansas as an engine wiper in the railroad shops at five cents an hour rose through his own efforts to become one of the world's most successful industrialists.

Truly a Tool Engineer who made good, as several A.S.T.E.ers who knew and worked with him well know, Chrysler spent almost all his spare time in studying his chosen profession and rose against his father's wishes (for his father was a railroad engineer and wanted Walter to stay out of the business and go for bigger and better things) to become Superintendent of Motive Power of the Chicago Great Western Railroad.

He first became interested in automobiles at the Chicago Automobile Show of 1908 and mortgaged his future to buy a $5000 Locomobile Touring Sedan. This he completely dismantled in his spare time and put back together again in his studies of its construction.

In 1911 he left the railroad business to become Works Manager of the Buick Motor Company and he soon introduced such improvements that production went up from 45 cars a day to 200, and somewhat later it reached 150,000 a year. In 1916 he became president of the Buick Motor Company in which capacity he served until 1919. Then in a disagreement with the owners over the expansion policy he resigned his post and retired from business life.

But in 1920 he came out of retirement to take over the ailing Willys-Overland Company and at the same time undertook to reorganize the old Maxwell Company. It was during this period that he

T. H. L. FRONT LEVER
BENCH PUNCH

Built for hard, tough work—die cannot lose alignment with punch — all parts interchangeable.

Capacity ½" holes through $\frac{3}{16}$" steel; $\frac{13}{32}$" through ¼" steel. Can also be made for holes up to ⅞" in thinner metal. Stock punches and dies available from $\frac{1}{16}$" to ½" by 64ths.

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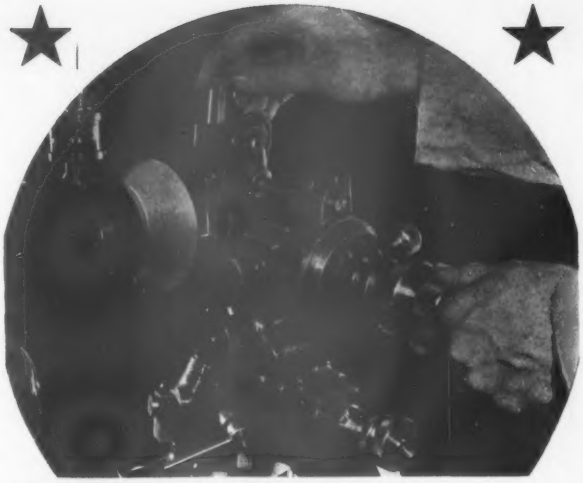

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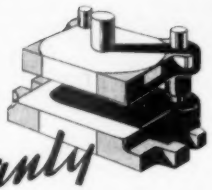

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DIE MAKERS' SUPPLIES

first met Fred M. Zeder, Owen R. Skelton, and Carl Breer, and after Chrysler's work with Willy's was finished in 1922 the four set out to design a new car. They christened it the Chrysler and it was launched to the public in 1924 at a private showing because they had been refused space at the regular auto show. Almost immediately the car was a success and by 1927 Chrysler rose to fifth place in the industry. In 1928 he bought Dodge Brothers, then heavily in debt, but by 1937 when he published his memoirs there was no debt remaining upon the Chrysler Corporation

Tool Engineer Chrysler
Embodied the American System

of any kind. His last job was to negotiate a settlement with John L. Lewis in the strikes of 1937.

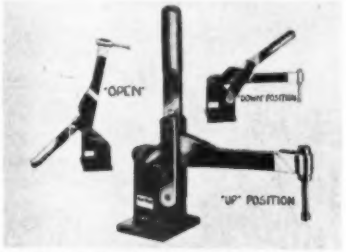
Walter Chrysler was truly the embodiment of the American tradition. From humble beginnings he rose entirely through his own efforts to become a skilled engineer and under his direction the mass production technique was developed by General Motors. Then from his brilliant successes as a Tool Engineer in the days when the term was unknown he became a great industrialist anad one of the principal competitors of that same General Motors he had helped to build. He died with the tremendous satisfaction of knowing that through his efforts he had helped to bring the motor car to its present universal use in America and that through the corporation he had built he had provided jobs, directly for more than 75,000 people.

James P. Maher, 47 assistant general manager of the Chapman Valve Manufacturing Company, Springfield, died recently after a short illness.

Charles Frederick Schenck, manufacturer and salesman of machine tools, died Aug. 1 at the age of 62. Mr. Schenck was part owner of the Hess-Schenck Co., machine tool manufacturers of Cleveland, and salesman for the Toledo General Manufacturing Co. for the eastern and central United States. He is survived by his wife and daughter.

Karl W. Johnson, president of the Commonwealth Screw Company, Worcester, died recently.

KNU-KAM-KLAMPS



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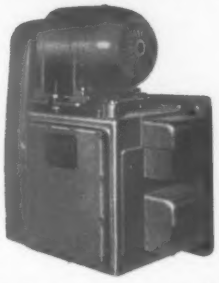

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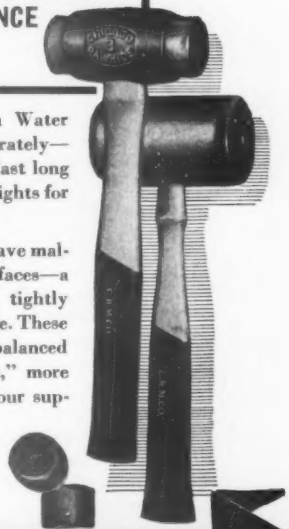

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SEPTEMBER CHAPTER MEETINGS

BALTIMORE—Sept. 4th. Dinner 7:00 p.m. Technical Session 8:30 p.m. Sears Auditorium, North and Harford Avenue. Speaker: Walter R. Boehme, Dept. Head, Tool and Mach. Analyzing Dept. Pt. Breeze Wks., Western Electric Co. Subject: Design and Manufacture of Punches and Dies for Small Metal Parts. F. R. Lamb will also be present. Make reservations with Stanley S. Johns, 806 Evesham Avenue, Baltimore. TUx.2127.

* * * * *

CLEVELAND—Sept. 13th. Dinner 6:30 p.m. Technical Session 8:00 p.m. Allerton Hotel, Chester and E. 13th St. Speaker: F. O. Hoagland, Master Mechanic, Pratt & Whitney Co., West Hartford, Conn. Subject: "Jig Borers and Some of the Problems Connected with Them—Illustrated". Make reservations with Mr. W. Reif, Jr.

* * * * *

DAYTON—Sept. 9th. Dinner 6:30 p.m. Technical Session 8:00 p.m. Gibbons Hotel. Speaker, Albert Schnaitman, Warner & Swasey Company, Cleveland, Ohio. Subject: Telescopes and Turret Lathes.

* * * * *

DETROIT—Sept. 12th Dinner: 6:30 p.m. Technical Session 8:00 p.m. Speaker: Mr. Bert Carpenter, Past-President A.S.T.E. "My Experiences in War Torn Europe". Also moving pictures of "Know Your Money" with Speaker furnished by the U. S. Secret Service and another movie "Michigan Wild Life".

* * * * *

HARTFORD—Sept. 5th. Dinner 6:20. Third Birthday Celebration. Hotel Faust. Speakers: J. H. VanDeventer, Editor of "Iron Age" and Ralph L. Lee, Public Relations Department, General Motors Corporation. Make reservations with Allis Chalmers, 510 Gas-Electric Bldg., Telephone Main 6270.

* * * * *

MILWAUKEE—Sept. 12th. Dinner 6:30. Technical Session 7:30. Republican Hotel. Speaker: Jerry Krandall, Vice President, Abrasive Dressing Tool Company. Subject: Sound Film "The Romance of Diamonds."

* * * * *

NEW YORK-NEW JERSEY—Sept. 10th. Technical Session 8:00 p.m. Robert Treat Hotel, Newark, N. J. Speakers: Mr. Howard Coonley, Chairman of the Board, National Association of Manufacturers, on "The Tool Engineer and National Defense," and Mr. C. L. Searles, Western Electric Company, on "Personal Improvement."

* * * * *

PITTSBURGH—Sept. 13th. Dinner 7:00. Technical Session 8:30. Edgewater Country Club (Churchill Road). Turn Right from Route No. 22 one mile east of Wilkinsburg. Speaker: Major Al Williams will talk on aviation and its possibilities for national defense. Arrange a foursome to play golf in the afternoon on one of the best golf courses in Allegheny County. Greens Fee $150.

* * * * *

ST. LOUIS—Sept. 12th. Dinner 6:30. Technical Session 8:00. Melbourne Hotel, Grand and Lindell Blvd. Speaker: W. W. Edens, Metallurgist, on "The application of the various aluminum bronzes." Reservations: Ray Karr, Melbourne Hotel, Phone Jefferson 6980.

* * * * *

SCHENECTADY—Sept. 9th. Technical Session 8:00. Rice Hall, General Electric Company. Speaker: Ford Lamb will speak on "Tool Engineering—Its Development and Future."

Sept. 14th. Clambake. Endries Park, Saratoga Road. A fine all-day program starting with golf at 9:00 a.m. and sports all day. Breakfast at 11:00 a.m. and the "bake" at 5:00 p.m. Reservations with H. Crump, General Electric Company, Schenectady, N. Y. Bring a guest.

* * * * *

SOUTH BEND—Sept. 12. Rotary Room, Oliver Hotel. Speaker: Harry Reichert, Keller Division, Pratt and Whitney Company will speak on "Keller Machines and their Uses." Stanley Cope, President of Acme School of Die Designing, will speak on "Training Die Designers."

* * * * *

TOLEDO—Sept. 10th. Technical Session 8:00. Spicer Mfg. Co., 4100 Bennett Rd. Speaker; J. E. Padgett, Vice President in Charge of Engineering, Spicer Manufacturing Co. will speak on "Torque Converters". Lunch afterward. Reservations: R. H. Mogle, Secy., 3722 Leybourne Ave. Phone La 8783.

* * * * *

TRI-CITY—Sept. 11th. Technical Session 7:30. Olive Singer's Home, Rock River. Speaker to be announced.

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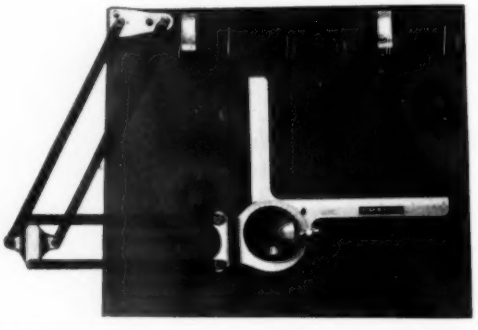

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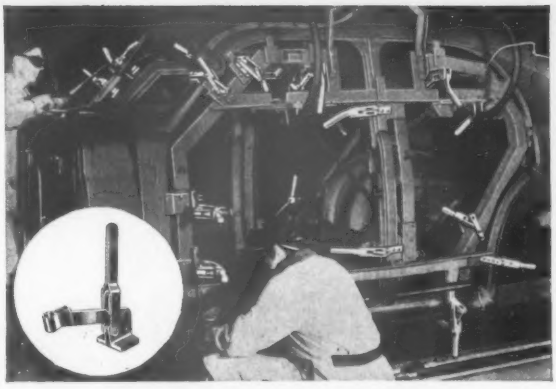

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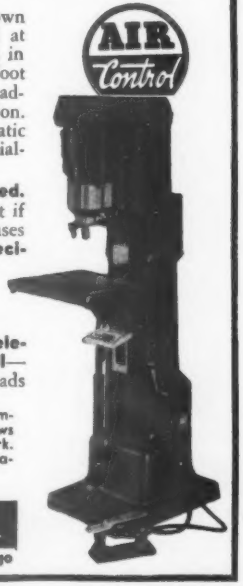

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7/64	1.66	2⅞
1/8	1.76	3
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5/32	2.05	3¼
11/64	2.19	3⅜
3/16	2.36	3½
13/64	2.56	3⅝
7/32	2.79	3¾
15/64	3.05	3⅞
1/4	3.29	4
17/64	3.65	4⅛
9/32	4.01	4¼
19/64	4.38	4⅜
5/16	4.75	4½
21/64	5.23	4⅝
11/32	5.72	4¾
23/64	6.21	4⅞
3/8	6.70	5
25/64	7.29	5⅛
13/32	7.91	5¼
27/64	8.50	5⅜
7/16	9.12	5½
29/64	9.72	5⅝
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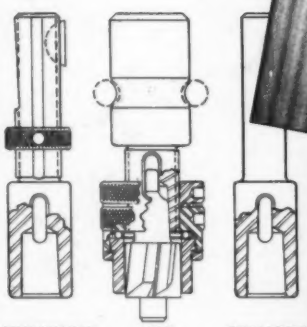

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